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ABSTRACT

This scholarly journal, an official publication of the Reading Recovery Council of North America, provides an interdisciplinary forum on issues related to the acquisition of language, literacy development, and instructional theory and practice. Articles in Volume 7, Numbers 1 and 2 (comprising volume 7) are: "The Why? What? When? And How? of Tutoring: The Development of Helping and Tutoring Skills in Children" (David Wood); "You Go to b ab t rod the 16 levo [You Got to Be Able to Read the 16 Level]: Derek's Literacy Learning Story in First Grade" (Maria Luiza Dantas); "Metacognitive Strategy Knowledge: Comparison of Former Reading Recovery Children and Their Current Classmates" (Maribeth Cassidy Schmitt); "Envisioning Story: The Eye Movements of Beginning Readers" (Peter Duckett); and "Phonemic Awareness: Clarifying What We Know" (Marilyn L. Chapman). (NKA)

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The Why? What? When? and How? of Tutoring: The Development of Helping and Tutoring Skills in Children

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I'm sure that, like me, most of you share a view of the learning process and the design of effective learning environments in which the learner is active, selective, and constructive. For me, learning is also an inherently social process. The learner may want to dispute, to contest, to discuss, or to coordinate and reconcile different points of view. When in difficulty, it's often wise to look for help, and in a good learning environment, that help is available.

My topic for today is tutoring and learning. I will put most of my effort in this first presentation into discussing the analytical and technical questions about the what, when, and how of tutoring, but I would like to concentrate first on the why. Why tutor? Like all why questions, it essentially forces you back to your values: it's not about evidence so much as ethics, values, and moral stance. So, I'm going to start by saying a little bit about why I am involved, interested, and fascinated by the very complex human activity we call tutoring.

THE WHY OF TUTORING

In a nutshell, the argument I'm going to try to persuade you to accept runs something as follows: tutoring is an outgrowth of helping. Helping is an innate human propensity—we're born to help. Even though helping is a natural part of human nature, it is a much neglected topic, particularly in research. We often have a lot to say about our psychological problems rather than our strengths. One reason I'm interested in helping is that I want to try to do a little bit to restore the balance. What I'm going to try to persuade you about in looking at the development of helping in children is that there are some fascinating phenomena about childhood about which we know very little.

My own interest in tutoring did not start, in fact, from the moral issue of needing to understand human helping. It really stemmed from a series of experiences when I was working at Harvard in '69 through '72. A colleague of mine, Ken Kaye, was doing a study looking at cooperation between pairs of toddlers of about 18 months to 2 years of age. He'd shown one toddler how to solve a very simple problem. The task was this: you have a transparent tube, and inside the tube is a pile of cookies. The problem is such that if the child learned to press a little lever on the bottom of the tube, a little cap lifted up (rather like one of those flip-top trash cans), and the child could pick out the top cookie. You can train 18-month- to 2-year-olds to solve that problem quite easily, but the question Ken was asking was what happens when, having got one toddler sated with cookies, you introduce another toddler who does not know how to solve the problem into the situation. Well as you might imagine, within a short period of time, what the new toddler does is to go up to the transparent tube and tries unsuccessfully to get a cookie out. He or she usually starts to get increasingly frustrated in the process. The question now is what does the first toddler do? By 18 months to 2 years, children would spontaneously help each other.

It struck me then that what was going on here was that when people (even very young ones) see somebody else doing something that they themselves can do, and see them getting frustrated by not being able to do it, then there's a perceptual invitation to get involved. Some of us feel the invitation very strongly, others not quite so strongly. What I'm asking you to believe is that there is a natural invitational quality in the sight of people failing to do things that you can do and that this is the basis of helping.

My second experience was quite a different one. It came from an investigation that Jerry Bruner and Barbara Koslowski (1972) were doing on the development of reaching in babies. Bruner's argument was that you didn't need reinforcement to explain the emergence of reaching behaviors (this was in the 1960s, don't forget, we were still fighting the reinforcement battle). Such learning, he argued, is driven by an intrinsic drive for mastery. Bruner and Koslowski argued that babies have the intention to reach before they successfully manage to reach. There are good physiological reasons why they can't reach early in life: their muscles are very underdeveloped. Human babies are born in a very immature state physiologically, so they don't actually have the anti-gravity muscle power in their shoulders and in their arms. They can't actually reach because they don't have the power to do so.

What Jerry and Barbara did was to film babies in their pre-reaching phase. The kinds of things they observed were really quite neat. For instance, if you dangle a small object in front of babies' eyes, they would make small grasping movements, like grabbing their clothes. If you put a large object in front of their eyes, they might lean forward, bending from the waist, and throw open their arms. The argument continues that in the pre-reaching stage you see all the pre-adaptive components, which show that babies already know what they have to do: a big reaching movement for a big object and small reaching movements for a small one. All the components were there. The baby's mouth was meanwhile going like mad, drooling away. It was quite obvious where the object was going to finish up when the baby eventually got it.

I was present when Jerry presented this film to an undergraduate psychology class. What struck me as I was sitting offside and to the front was the reaction of the students. In the film, you saw all this really strong intentional behavior: the infants weren't reaching but trying to reach, and there was no sense of consummation at the end (you never got to see a baby get an object!). The students were on the edge of their seats, the tension in the room palpable. Again, it struck me that here was the same kind of phenomenon taking place as I'd seen with Ken's toddlers. When you see someone trying to do something that you can do and they're struggling, there is a real desire to get in there and help. The students in Bruner's class wanted to get in there and give the object to that baby. And babies know it, right? Do babies look for help?

We know that seeking help certainly occurs well in advance of language. Suppose you look at babies in the first 4 months of life. A good way to characterize what goes on is that they're experiencing a love affair with the human face—they will remain locked on a face. At about 4 months, when they usually start to reach, they become more locked into the world of objects and begin to scan and look at things, particularly bright, moving ones. Then, at somewhere about 8 to 10 months—it varies from child to child—babies start to coordinate looking at objects and looking at people, often looking from one to the other. And when they learn to reach but an object lies out of reach, they will look at a nearby person as they stretch out (asking for help?).

So my argument here is that babies are innately endowed with some knowledge of the social world, and they expect (though not, I suspect, in a conscious sense) others to be able to help them to achieve intentions that they can't yet achieve themselves. They're natural help seekers. That's the theme I'm going to take up later. I am going to be looking at help seeking and the role of help seeking and self-helping in development as sources of individual differences that contribute to learning.

One final speculation about the why of tutoring concerns the dominant view of human evolution as a theory of sociobiology and the selfish gene. The basic idea is that genes are driven, as it were, to perpetuate themselves. The explanatory unit of evolution is the gene, not the species. You can go a long way in understanding huge sways of physical evolution and mental evolution on the basis of the assumption that selfish genes drive the process.

I was delighted to hear recently one of the main architects of this theory, Richard Dawkins, admit that there is a real problem with sociobiology theory. The problem is they cannot understand deep altruism. Surface altruism, or reciprocal altruism as they tend to call it, is easy. That's where you help people who help you, particularly members of your own family. There's no problem, for example, understanding why aunts help nephews since they share familial genes; the genes drive the aunt to help the nephew because in that way there's a greater probability that some them will get perpetuated. What Dawkins (1989) says sociobiologists can't understand is a phenomenon like adoption. They cannot understand how putting an investment into an organism that is unlikely to share any of your family genes has any possible evolutionary value for the genes. Yet that's what teachers do all the time. They help children to learn so they can adapt better to the environment, yet few of those kids are going to be genetically related to the teacher. So my challenge to social biologists is not only to understand phenomena like adoption, but also to understand helping and explain teaching.

Those, then, are some of the reasons why I think we should be interested in tutoring, not just because of its obvious practical significance for educational purposes, but because it is fundamentally important for understanding ourselves. Teachers are an enigma; they should not exist on a psychobiological account, and yet I know all too well that teachers do indeed exist.

THE HOW, WHAT, AND WHEN OF TUTORING

I want to talk now about the more analytical and the technical aspects of the how, what, and when of tutoring. I'll use an example that has to do with the development of concepts of number and counting in young children. I think it's absolutely fascinating work, and I'm going to focus you on the age of 6, when children are just beginning to understand what my colleagues in math call *base value ten*. These are students who already know that 15 is more than 12 and understand that if you've only got 12 p and you want to buy something that costs 13p or 14p or 15p, then you haven't got enough money. They can count well beyond 15 or 18, or whatever the numbers are that you are dealing with, but there's a very important watershed that these children have yet to go through. They can't yet count on from 10.

The best way to describe this is through a study invented by Nunes and Bryant (1996). Imagine that you've got a wallet, and in full view of a 6-year-old child, you put 7 pennies inside the wallet. You put the wallet down, and the child knows full well and can tell you that there are 7 pennies in it. Then you give them some more pennies outside of the wallet and ask them to count up to 11 pennies. There aren't 11 pennies outside the wallet, so the child needs to remember the fact that there are 7 pennies inside the wallet to get to 11. Got the situation in mind?

Children we face with this task fall into three groups:

- One group will count the wallet as one. So they count "one" and then count the pennies outside the wallet. They remember the pennies inside when asked, but they don't seem to know that they can be used as a set of 7.
- Then there is an intermediate group that will count "1, 2, 3, 4, 5, 6, 7" (pointing to the wallet), and then count "8, 9, 10, 11" over the pennies outside.
- The third group, the count-on group, will just count "7" (for the pennies in the wallet) and then "8, 9, 10, 11."

It's around the same time that the groups of children who can count on begin to discover that what we call a 10p, or in the United States 10 cents, represents a set of 10 units and that it too can be counted on from. The mastery of such number concepts is really quite complex (Piaget came up with a good explanation of what's going on, but we won't go over that here).

Now, this is the question. We know that this understanding about counting on is emerging round about the age of 6. We have used Bryant and Nunes' shopping task to do some roaming around the known, in Reading Recovery terminology. The question we asked is what happens when you put two children together, one who does not yet have the idea about counting on and one who does, and give them a shared task. You give the children a couple of 10-

penny pieces and a bunch of pennies, and you ask them to go shopping and to buy something. If they count up all the objects (counting the 10-pence pieces as "ones"), they haven't got enough pennies to buy this thing, but if they count on from one of the 10-pence pieces they will have enough.

So what do the pairs of children do with the shopping task? We tell the children we want them to agree on whether there's enough money provided to buy objects (that they can only afford if they count on from a 10-pence piece). We ask them to take turns doing the counting. First one of the children does it, then the other child. Each time we ask, "Do you agree with the answer?" Here's an episode from one pair.

> *Two children sitting at a table with an adult.*
> Adult: This costs 15 pence. Do you have enough?
> Girl: (counting) 10, 11, 12, 13, 14, [illegible]5. Do you agree?
> Boy: Uhmm...
> Girl: Let's do it again. 10, 11, 12, 13, 14, 15. Do you agree?
> Boy: Yes.
> Girl: Okay.
> Adult: This time, Lee counts first, and we have something else this time. This new eraser costs 18 pence. Do you want to see if you have 18 pence?
> Boy: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14 (counting a 10 p as 1). No, we don't have enough.
> Girl: This is 10 (picking up the 10p). 10, (slowly) 11, see these are pennies so we count them, 10, 11, 12, 13, (slowly) 14, 15, 16, 17, 18. Because these are pennies, okay?
> Boy: I agree.
> Adult: He agrees with you. Have you got 18 p here? (Girl counts under her breath and nods in agreement). Would you like to count and see if you agree with that, Lee? Count and see if you agree.
> Boy: 10, 11, 12, 13, 14, 15, 16, 17, 18.
> Adult: Okay, we can move on then if you agree.

We came back the next day, and we asked the boy to do a whole variety of counting-on tasks on his own. We found that he had mastered the idea. The girl is no doubt a joy to her mother! I bet she's a joy to her teacher, and I suspect she's a joy to her friends. For me, the study really gives rise to the question, "Are teachers born or are they made?"

Another thing that is significant on the video clip is the expression on that little boy's face right at the beginning when he first tries the task. I think his thoughtful look suggested that he was experiencing an absence of a strong feeling of knowing and that he knew there was something he didn't quite understand about the task. I want to come back to that later when I discuss self-correction and help seeking.

In this study, we deliberately chose children who were just on the cusp of discovery about counting-on to work with their more knowing peers. So I'm not suggesting that what we have seen would be a common happening in daily life. But the example demonstrates that, although no one asked the girl to help and no one asked her to teach, she did so naturally. She was not the only child to do so, though most were not nearly such competent helpers.

I want you to note that when she handed over the 10p to the other child, she started the counting off but then stepped back. Another thing I want you to notice is the lovely, gentle pace of the interaction. These situations, when they work like the one you have just seen, are like a ballet. They do happen in other contexts. We know, for example, that children as young as 4 years will adapt the speed and complexity of their talk when they speak with younger children, adapting their communication to fit their interlocutor, the other person. Those abilities are being brought to bear (they are abilities, not really skills because skills are acquired through training and learning) in the example we have just shared.

TUTOR CHALLENGES

What I'm urging you to accept is that the example of the 6-year-olds represents a complex bringing together and integration of a range of competencies and skills in order to tutor others. These are competencies and skills that experienced and effective teachers have developed and honed to a fine art. But there are still difficulties and challenges even for the experienced teacher—certainly there are for me when I try to tutor.

Tutor Challenges

- Knowledge of the task
- Relating knowledge to performance
- Perspective taking
- Self-inhibition: from doing, to guiding, to fading
- Communicative competence
- Timing

Knowledge of the Task

One reasonably self-evident problem is that having knowledge of the task is not enough to guarantee effective tutoring. There were children in the study I have just illustrated who knew perfectly well how to do the task but seemed incapable of helping the other child in a contingent fashion. One outcome of our research is the finding that the chances that learners will be able to go on to do a whole range of tasks that they couldn't do before they were tutored depends on the contingency of their tutoring experience.

Relating Knowledge to Performance

What these children have to do in order to provide contingent support for learning is to relate their knowledge of the task to the ongoing, dynamic performance of their peer. This is a really hard and difficult problem. It demands what Jerry Bruner years ago called the "pedagogy of subject matter knowledge." In other words, it's not enough to know about the knowledge and skills that go into competent task performance, you've also got to know how to interpret and react to the various difficulties or sequences that learners are likely to go through as they themselves develop that knowledge and master those skills.

Perspective Taking

Some children as young as 3 years are quite able to put themselves in the perspective of another child and provide help that is contingent on that perspective (Wood, Wood, Ainsworth, & O'Malley, 1995). If you can't or will not try to see a situation from the learner's point of view, you are very unlikely to provide assistance that proves helpful.

Self-Inhibition

Another challenge is self-inhibition: leaving enough space for the learner to demonstrate whether he or she is able to carry out the task. George Herbert Mead (1950) pointed out that when we ask somebody to do something, politely, and they don't do it, we tend to get annoyed, especially if we have to ask two or three times. If they still don't do it, you tend to do what you asked from yourself. Mead argued that language sets up a tension and an urge to action in the speaker. I think that such tensions come into play when, in tutoring, you suggest actions to the learner but refrain from doing what you yourself suggest.

I think, in fact, that self-inhibition is a fundamental problem in teaching, and that's one reason why what the 6-year-old girl was doing was so special. She was able to set the other child going and then seemed naturally to inhibit herself from further action in order to leave space for the other child to demonstrate whether he was able to carry on with the task. I also think the need for constant self-inhibition in tutoring is why teachers of young children are often wrung out at the end of the teaching day. It's very, very stressful to inhibit yourself and to deny yourself the right to act.

Communicative Competence

Self-inhibition is one foundation for communicative competence in tutoring. The tutor also can't say too much in the course of the interaction without the risk of losing or boring the learner. They must also be prepared to fade their role in the interaction, ultimately remaining mute and inactive. This all needs to be done in such a way that what is formulated by way of hints or suggestions happens in a way that's likely to be understandable to the learner. The child in the example provided was a star. Hers was quite a minimal style of teaching if you think about it: everything said was precise and to the point.

Timing

Timing in tutoring is, I think, another real challenge. In Reading Recovery I am struck by how you use time. You've got 30 minutes or so and so much to do. What I'm going to try to persuade you of is that it is worth thinking about how you use that time in some detail. Consider that there are times where and when the child needs to move on and work relatively fast. How do you separate these occasions from the times when the child needs to take time for thought—time to try for self-correction being one of those? How on earth you regulate your own use of time in real-time tutoring, I don't know. Some of you obviously do it, but I think that it is extremely difficult, so I want to spend a lot of time later talking about the nature and role of timing.

ESTABLISHING AND MAINTAINING THE TUTORIAL RELATIONSHIP

This goes right back to the 1970s, to the very first paper that Jerry and I wrote on what's going on as one person helps another to solve a problem that, left alone, they can't solve on their own (Wood, Bruner, & Ross, 1976). Jerry's got a much nicer way of putting this, he calls it the "loan of consciousness." That's one of his more poetic turns of phrases. I quite like that.

So, what we're suggesting is that there are a number of fundamental activities involved in establishing and maintaining the tutorial relationship.

Learning and Tutoring: Scaffolding Functions

- Task induction
- Highlighting and salience
- Removing distractions
- Reducing degrees of freedom
- Reminding
- State maintenance
- Modeling

Task Induction

This is really, I think, what you do when you're making use of running records to design lessons: you're trying to find a task that is challenging but manageable and into which you can induce the learner. I think there are some really deep things underpinning this, not the least of which is the role of an absence of a strong feeling of knowing on the learner's part. By a feeling of not knowing, I mean the sense that there's more to be known than what you currently know, but you don't know what that knowledge is yet. Setting manageable problems for the learner really represents an attempt to solve the problem of what is it that the learner can just begin to recognize but not yet produce, I will argue later. That's the challenge of manageable problems, and it's where we grossly go wrong in schools in my opinion; I think it is one of the major challenges facing schools.

Highlighting and Salience

That little girl in the example did this beautifully: "This is 10…10 (slowly)." I think that is one of the most important scaffolding functions, where you draw the learner's attention to something that the learner has not yet taken full cognizance of. My suspicion is, and I've got no real evidence of it, is that this is the way tutoring often works in everyday life. Children observe other people paying attention to things that they haven't yet thought to pay attention to for themselves. In other words, the tutor makes new parts of the world salient for the learner.

I think a lot of what I saw in Reading Recovery (in fact Marie Clay has written a good deal about it) concerns the nature of the strategy that the teacher uses to help the child overcome problems. The focus of the teacher's attention at this point is vital because what the teacher highlights is what the learner is likely to attend to. So, for instance, if you provide learners with a way of solving a problem that only relies on local situational cues, you may limit their learning. If, on the other hand, you draw their attention to more strategic clues which they can then use themselves on later occasions to solve the same kind of problem, you can help them to learn generic strategies rather than just support local learning that has limited power of generalization. I think this is another really crucial issue.

Removing Distractions and Reducing Degrees of Freedom

In the pyramid-building tasks that we used in our early studies, we often saw mothers resting their hand over a block, serving to hide it so that their child would not get monopolized by it. They essentially freed the child to concentrate on other potentially more timely things by reducing the scope of the task. We often do achieve the same function by verbal means—asking the child to ignore some features or to pay attention to others. By such means, the tutor can progressively simplify the task to a point where it comes more within the learner's grasp.

Reminding

You do a lot of this in Reading Recovery lessons, where, for example, you remind the child of a word, letter, sound, or written symbol that you know he or she has shown some mastery of previously and may be able to use to meet a new demand. In this way, you may help children to develop a strategy of reasoning by analogy from past experience and to appreciate that they have relevant knowledge that, if they thought to bring it to bear on the current problem, they could use as a frame to help solve it. In this way you may also enable them to achieve joint success on a problem that they can't currently bring off by themselves. Of course, an important issue is how you highlight the task to promote strategy development, and not just local learning. Reminding is also a very powerful scaffolding tactic for state maintenance.

State Maintenance

I think you wisely keep your lessons to 30 minutes in Reading Recovery. There's a lot of evidence on your side. It's the same in lectures where, after about 20 minutes, you find that the retrieval rate for what is presented starts to fall. The importance of being in the right state or level of arousal for the learner to learn is crucial, and if you go on for too long, you risk losing the child. I keep asking my neurophysiological colleagues what biological processes underpin this phenomenon. We seem to be able to play games forever, and we can watch a film for a long time; yet somehow, when we are doing intense intellectual work, which is right in the limit of our zone of proximal development, we can concentrate for about 20 minutes, and then we're shattered. Why? My colleagues don't seem able to answer me.

Modeling or Demonstration

I'm not going along with the early behaviorists who said that modeling and imitation are primary vehicles of learning and knowledge transmission. I think the processes involved are much more subtle. The child who tries to emulate what he or she sees other people doing and achieving is clearly exploiting a remarkably powerful way of learning, especially learning in everyday life. But modeling and trying to teach through demonstration and imitation can be seriously overused and abused in tutoring, and there are limits on its efficacy as a tutoring strategy.

CONTINGENT SUPPORT FOR LEARNING

Imagine we see a child or a learner who we think is in difficulty, and we decide that the time is right to intervene. We have decided *when* to tutor, and the question now becomes *how:* What kind of support for learning are we going to use?

Contingent Support for Learning

- Level 1: General verbal intervention
- Level 2: Specific verbal intervention
- Level 3: Specific verbal intervention plus nonverbal indicators
- Level 4: Prepares for next action
- Level 5: Demonstrates action

A good tutor will treat each of these tutorial moves as a hypothesis. They're really hypotheses about how much help the learner needs to do what it is they're trying to do. They're not one-size-fits-all moves.

Level 1: General Verbal Intervention

A general verbal intervention might be something like "It could be" or "You have a go" or "It's your turn now"; it could be a note of warning: "I'm not sure about that." A general verbal intervention is really signaling the current state of activity, but it's not trying to provide a distinct goal or objective to the child; it's not reducing degrees of freedom by very much. It's very important because it's signaling the fact that you are there and you're monitoring what's going on. It may give general feedback about efficacy ("Oh, that's great" or "Not too sure"). It's providing an external evaluation in general terms of what is happening.

Level 2: Specific Verbal Intervention

The hallmark of a specific verbal intervention is that you start to specify some action or something to pay attention to be searched for. Often, this may be expressed as a question. The task of taking that question or taking the utterance and translating into the next step is then left to the learner. In the construction task[1] you saw illustrated on video, next steps suggested included, "Why don't you find the next biggest blocks?" or "I don't think that one looks right, I think it's too small to go on top there." You're giving a specific verbal specification of the next step or of some specific feature that needs to be put right.

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[1] The task referred to is a construction toy that invites children to put together 21 blocks to create a pyramid. Blocks can be assembled by fitting pegs into holes in order to create different-sized levels of the pyramid. Children also have to pile the levels from largest to smallest in order to create the final structure.

Level 3: Specific Intervention and Nonverbal Information

This is where the tutor adds some nonverbal intervention to what he or she says to the learner. It is the kind of situation where you point to highlight what you might be referring to verbally or where you provide a frame in which you're going to concentrate the child's attention by nonverbal cues (such as looking or pointing). So here you're beginning to solve the search problem for the child. With only a verbal instruction (Level 2), you leave the child to do all the searching in the situation. With Level 3, you're providing clues that help the child to solve that search problem.

Level 4: Prepares for Next Action

Level 4 is essentially the same as a closed question in verbal interaction. "Is it A or is it B?" or "Does that sound like s-or-t?" Here you are essentially offering the learner two alternatives to choose from: either an alternative for attention or action, or a choice between acting or of not acting at this point. Now you're really exerting very strong control over the next action.

Level 5: Demonstrates Action

You might take complete control over the next action by demonstrating or modeling what it is that should be done next in order to achieve success.

So, being contingent means

- When the learner is in trouble, offer help immediately. If you've already offered help and the learner is still in trouble (for example, you thought that giving the child a specific verbal hint or asking a specific question might be sufficient, yet the child appears not to be able to understand), you immediately offer more help.
- When the learner succeeds with help, offer less help if you intervene again. Obviously, if you're already just providing very general feedback, that's an invitation to just get out of it and leave the learner to get on with it. But if, for example, you use a Level 3 instruction (where you've not only told the child but pointed to something), then the next time you meet that problem or demand, you are going to want to step back and maybe try Level 1 or Level 2.

All of this sounds so easy, obvious, and typically what happens in tutoring. But it is not easy and does not occur typically. Often, what you find in tutoring situations, for example, is that tutors will insist on repeating what they've already said, often adding more detail, thus increasingly obscuring the message from the learner's point of view.

- Keep to the point and be succinct.
- Always succeed.

These admonitions also sound so easy to follow, but they are also so difficult to put into practice. For example, suppose you give a Level 2 instruction to a child—you suggested a goal or activity. Suppose the child actually does something else entirely, but that something else is relevant to the problem. What do you do? Should you go to Level 3 on the basis that the child failed to understand Level 2, or do you change your tutorial goal to help the child achieve what you think he or she is trying to achieve? Obviously it's a privilege of occurrence issue: if the learner has to know something before mastering something else, then you wouldn't follow the learner. But if there's no privilege of occurrence (if you could be doing A but an opportunity to do B comes up, and B is equally important, and the learner seems to want to go there), do you follow the learner? I say you do, but it's actually very difficult to switch your objective in mid-interaction.

CONTINGENT TUTORING

The idea is that working collaboratively with the learner, you will have found the appropriate level at which that child can succeed, maybe only minimally, in completing the next step of the task. We now have to expand the theory and articulate it much more carefully to describe the dimensions of contingent tutoring.

Three Dimensions of Contingent Tutoring

1. Instructional contingency – **how** to support activity
2. Domain contingency – **what** to focus on next
3. Temporal contingency – **if and when** to intervene

Instructional Contingency

I've just been illustrating one of the dimensions of contingency, instructional contingency. This focuses on how the tutor adjusts the amount of help offered, not only on the basis of the child's unaided task performance, but also on the basis of how the child responded to the tutor's previous attempts to help. Thus, the tutor has to remember how much help was provided before: "Was this child successful? If so, I must remember to fade this time." This is very, very difficult to do, but that's only one set of demands that is implicitly fulfilled when tutoring contingently.

Domain Contingency

Domain contingency concerns the issue of what to focus on next in the time course of teaching. Now, this is a multilayered requirement. It can mean what will be focused on the current task or in the next lesson; it could involve the choice of a book. How do you decide what to choose to work on with learners next? It's a case of the amount of uncertainty you think they can handle at one time. If learners have got too many uncertainties, too many ways of being tripped up, or of making an error, they may get as much feedback as you like, but it's no use if they are so overwhelmed that they don't know what the feedback is supposed to feed back to! Learners must be provided with a really solid base of success on the next learning task so that, if and when they do get into difficulty, they have a good chance of understanding what feedback is meant to refer to in their activity. It's a way of actually managing the intellectual challenge of the task. Maintaining a high success rate for all learners is a key demand constraining the definition of domain contingency.

Even when you've decided what task you're going to induce the learner into, you've got a secondary problem, which is that almost always, there is more than one way to solve any problem. Heather Wood and I have worked with the construction task I illustrated with over 600 3- to 5-year-olds. Yet, when we see new children working with the task, we still get surprises. Children will do things—some build from the corners outwards, for example, coming up with novel solutions to problems that I certainly never envisaged. And I designed the task! That means that you cannot have too fixed an agenda as a tutor. You've got to know where you're going, but it's really a process that we call *leading by following*. You've got to know where you're going but always maintain an element of flexibility, and you've got to be open to surprise—always. Even if you can't respond to surprise in real time, you may respond to it later and, perhaps, make use of what you learn in future tutoring. How many times have you, like me, experienced times when you had tried to explain something to a student, and you know you have made a mess of it? Later you think, "Oh, of course, the child thought such and such. Well that's fine because next time that kind of thing happens, I'll do a better job of explanation."

So there's the possibility of constant reflection and development of knowledge of the learning domain on a tutor's part—that's how the knowledge that goes into achieving domain contingency grows. That is also why learning to teach a discipline takes so long. You've got to build up a huge stock of really local, contextualized knowledge. That's why I couldn't write with authority about Reading Recovery, for instance. I simply do not have that knowledge. You've got it, I hope. There's no reason why I should be expected to have it, of course. Acquiring it requires real, practical experience over very extensive periods of time. The challenge we all face here at the Institute meeting is how can we support and accelerate this process; how can we promote the professional development of new teachers so that they can master high levels of domain knowledge more readily than their ancestors and tutors did?

Temporal Contingency (or One Reason Why We Decided to Study Computer-Based Tutoring)

We have discussed how to provide tutorial support, and now we return to the issue of if and when to intervene in the first place. I used to think this was a relatively straightforward issue, but not anymore.

When you saw the two children performing the shopping task, I drew your attention to the very gentle pace of interaction, and I think this was an important element in the success of their efforts. But how do we get to grips with the general question of how best to time events in tutorial interactions? Can you say ahead of time how long you should leave a particular learner to struggle before you provide any help, for example? No? Me neither. This has far-reaching consequences for our understanding of what it takes to become an effective tutor.

Marie Clay provides a detailed, elaborate, and well-grounded analysis of the knowledge and skills that go into the reading process. This analysis is absolutely key to understanding if, when, and how to offer tutorial help. She puts forward the image of the child as a problem solver who needs to access, use, and integrate multiple sources of information. That integration has to become smoother (certain aspects of it) and more automated over time. When you're thinking about your own domain and temporal contingency (whether it's based on knowledge you gain of a child by roaming around the known or from your running records or your actual tutoring), in order to make that vital selection of what kind of demand you're going to be putting on the learner (including if, when, and how to intervene), you have to have internalized Clay's analysis of the reading domain.

If you accept this argument, then it explains why it is impossible to give a general answer to questions such as "How much time should I leave before I decide to intervene?" But how can you study the importance of timing and temporal contingency if you think this is true? How do you get to grips with intuitions about the importance of temporal contingencies in tutoring and learning?

All of these questions came into sharp focus for me from trying to implement ideas about contingency in computer-based tutoring. Every commercially available tutoring system we found allows a fixed interval of time or a fixed number of attempts for learners before it stepped in if they didn't succeed. And then they are almost never offered contingent help. If, as a programmer, you can't decide ahead of time how long a period the machine should wait before the computer gives help, when it should hasten them on, or encourage them to slow down, you can't deliver contingent tutoring.

What Heather Wood and I decided to do in our computer-based studies was to leave decisions about if and when tutorial help is given to the learner. The computer was programmed to offer (instructionally contingent) help, but only on a request from the learner. But then you face another set of very interesting questions. Do children vary in how long they wait before they themselves decide they need help? Does this impact on how well they learn? Are some children more aware of the fact that they need help in the first place? Does it matter in terms of learning outcomes? Do some children disadvantage themselves by not seeking help appropriately? Do some ask for too much help? Put another way, how do learners influence the construction of their own tutorial experience? Does it take two to tutor?

IT TAKES TWO TO TUTOR

The following list outlines the topics that we will focus on in an attempt to get to grips with questions about how individual differences across learners influence the process of tutoring and help to construct the contingencies we observe in learner-tutor interactions.

- How the child regulates their own and the tutor's activity
- How the child reacts to impasse or error
- Ability or readiness to look for help
- Apparent inattention to help offered
- Over-reliance on help
- Allocation of time on task; speeding up and slowing down in line with mastery of the task at hand

I thought it would be useful to start by saying a few words first about the kinds of predictions and expectations that motivated that work and how these grew out of scaffolding and contingency theory.

There are, believe it or not, people who are critical of contingency theory! I think this is very sad. But it's true. There are a number of criticisms, some of which are pretty vacuous and others of which have got more weight. It was partially in response to these criticisms that I was led on to the title for this session.

There have been about 20 or so different studies of scaffolding and contingent tutoring in a variety of contexts (see for example Elbers, 1996). These have provided pretty good confirming evidence. But one critique is that there is so much focus on the tutor (who, in my experience, is very neglected in work on learning) and that scaffolding and contingency portray the child into a passive role. As far as I'm concerned, nothing could be further from the truth. I suggest a thought experiment.

Imagine that you've got a perfectly contingent tutor who is interacting with two learners, one who, for whatever reason, has a high aptitude for learning in this domain that the tutor is working in and another child who is a struggler. Given that the tutor is perfectly contingent, you should be able to predict, just by observing the tutor, the relative difficulties facing the two children. The contingent tutor, in a sense, wraps around the learner. The tutor wraps around by complementing what the learner needs to achieve success. So I believe that people are misguided in saying this casts the learner into a passive role. You cannot have contingent tutoring unless you recruit the child into collaborative interaction with you, and from then on, the contingent tutor's role is paced by the progress and the activity of the learner.

I think there is a deeper sense in which the critique has got some validity. Although we never looked in detail at individual differences among children in our early work (as we have pointed out in several of our publications), there are always some children who, even given far from optimum contingency of teaching, made extraordinary progress in learning. Some children learn with minimal help because they are blessed with high aptitude, whatever that means; other children struggle. This also relates to another criticism, which is that contingent tutoring isn't a very frequent experience in children's everyday life. I think that's a perfectly fair comment. Contingent tutoring is a description of an ideal that is almost impossible to achieve in practice because the complexities and the intellectual demands on the tutor are immense. Indeed, if I were to play God and I were designing a species that had to survive through collaboration, I don't think I would want to make that species so brittle that it could only learn under conditions which provide something like optimum tutorial support for the learning process! Contingency becomes a serious issue when we are dealing with learners who are struggling. Of course this applies to all of us some of the time. It applies to some of us most of the time. In fact, one of the studies I'm going to talk about later is based on a area of learning that most of us find difficult: polynomials in mathematics. We chose this domain because we know that the majority of otherwise bright, intelligent, easy-learning people find it a difficult concept area to learn.

So I accept that it is a fair criticism that you don't get to see a great deal of highly contingent tutoring in the world around us. It is really an ideal that becomes increasingly important as we deal with difficult learning situations.

One way to address the more general criticism about the impact of learners on the tutoring process is through the study of learner help seeking, about which I will have a good deal to say. People in various parts of the world have been looking at individual differences in children's help seeking—typically, seeking help from an adult tutor. You find a number of general findings coming out of the literature (for a brief overview, see Wood & Wood, 1999). In general, children who know less and who struggle to learn seem, on average, to be less skillful help seekers. They are less likely to seek help when their activity suggests that they are in trouble, and they also seem less able to make use of that help when it is provided. Now does that square with your intuitions? Anybody want to contest it? Is nature playing a cruel trick, then, because learners who need the most contingent tutoring seem less likely to signal to the tutor when they need their help and are less able to benefit from help when it is given? Are learners who need most tutorial support the ones who are least able to meet the tutor halfway in trying to provide a contingent learning environment for them? Are they experiencing a double whammy? Is there anything, then, in the notion that there is sort of a secondary aspect in learning difficulties, which results from the way in which children set out to help the tutor to construct their own learning environment? These are questions that motivated me into the "It Takes Two to Tutor" title and to provide a way of trying to paint a fuller picture of the learner's role in the formation of a tutorial relationship.

In what other ways might tutees influence the way in which tutors tutor them? In the video of the two children in the shopping task, the child who did not initially know how to count on from the 10p seemed, to me, a joy to help. We saw an example of super peer tutoring, but in a context where there was a quite engaging and easy-to-engage tutee. One of the characteristics that make this kind of child relatively easy to teach is, I suggest, their temperament. There is quite a lot of evidence now that extremes of temperamental type do have some kind of biological basis (for a fuller description of this work, see Wood, 1998). There's an excellent study by Bell and Waldrop undertaken here in the United States, back in the 1970s and early 1980s, in which they identified two groups of infants who formed two extremes of a normal continuum (most of us are in the middle of this continuum). At one end were the slow-to-warm-up children. These children were very difficult to get engaged in sustained interaction. Maybe they were destined to become the very shy children of the future. The other group was of impulsive children. What I liked about the Bell and Waldrop work was the way in which they showed how an individual's position on this continuum was associated with the incidence of minor physical abnormalities. Now these are things like having one toe or a finger that is relatively longer than the others or some slight abnormality in the shape of the tongue. It is unlikely that any association with these physical features and temperament is created by other people's reactions to children because they are largely invisible. This work provides the most compelling evidence that I know of to show plausible proof of a relationship between children's temperament and biological predisposition. What nobody's done (and I'll throw open to the floor in case anybody knows of work that I've not come across) is to look at the impact of these characteristics on social interaction later in life, let alone on tutoring. My bet is that there would be some pretty strong relationships, giving us a way to explore the impact of children on the tutor.

When we're confronted by children who we find difficult to teach, is it going to be particularly difficult to help them to learn how to regulate their own learning, a form of self-teaching? In other words, do children who are hard to teach find it hard to teach themselves? I believe that to a nontrivial extent, children do have to learn how to regulate their own learning. If so, any difficulty in learning through tutoring may have very general effects on future learning. I suspect, however, that it's not true of all children that those who are difficult to teach necessarily face problems in learning how to regulate their own learning. I don't think I was a very easy child to teach, for example (in fact, several of my ex-teachers have told me so). Yet, I think I do a reasonably good job of teaching myself. But I think there probably are some kinds of more specific associations between children who are difficult to teach and children who find it difficult to regulate their own problem solving, their own learning. In fact, one of the reasons I'm so interested in Reading Recovery is that you are explicitly trying to help children become more effective learners. Your work provides you with a natural context for finding out how far learning how to learn *can* be tutored.

So here is another set of questions that helped to motivate the design and analysis of the studies that I'm going to talk about. Again, I underline the fact that I'm going to be talking about how children learn from computer-based environments, and I recognize that it is hazardous to generalize what we might learn about help seeking, self-regulation, and learning there back into face-to-face tutoring. I haven't yet explored the relationships between how children regulate the learning environment when it's a mechanical tutor and how they regulate their learning with teachers. In fact, I think you will see, as we go through the details, how extraordinarily difficult it would be to study children in face-to-face interaction in the same depth that we can with a computer-based tutor that automatically registers and stores so much detail about the interaction. So, I may speculate about what computer-based studies imply for human tutoring, but I will welcome your views on whether you think any generalizations look sound.

LOOKING FOR HELP WHEN YOU'RE IN TROUBLE

One crucial area to look at is how learners react when facing an impasse, error, or a difficulty in their activity. This seems a reasonably self-evident focus, since if children actively seek help when they don't know how to proceed, they can help the tutor to construct a contingent learning environment for them. In the computer tutors that we've developed, we leave it to the child to decide when to seek help. So, temporal contingency (decisions about if and when to intervene) are put into the child's hands. Instructional contingency is in the tutor's gift. The child decides when he or she is going to receive help, and the tutor uses what can be seen as a simple running record of recent performance to decide how much help the child seems to need. On the basis of the child's response to help, the tutor then either offers more help or starts to fade. So we can start to get a grip on how different children seek help when they feel themselves to be at an impasse or in error.

When we first started designing this approach to temporal contingency, I was talking to John Anderson who, at Carnegie Mellon University, has done pioneering work on computer-based tutoring with his colleagues. He has urged caution about leaving help seeking to learners because he suspects they might abuse help by using it to avoid effort. In other words, they'd use the help to drive the tutor to give them answers rather than trying to work things out for themselves. Now, I've got a different and perhaps more benign view of learners. I believe that if learners need and are offered Level 3 help, they will naturally tend to work out and provide an answer. I don't think they will drive the tutor on to Level 5 and an answer (unless, perhaps, they want to confirm an answer that they have in mind). So, will children generally be help abusers? Would you expect some or most children to avoid effort by overusing help?

From my reading of the help-seeking literature, I suspected that more children would be help refusers (either refusing to seek help or not appreciating a need to seek it) and that most help refusers would be the children who needed that help most—a nice, testable hypothesis.

A second issue is whether or not some children are harder to tutor contingently because they cannot or will not understand offered help. So we ask, "Are all children equally likely to be able to make successful use of help when they do request it and it's provided?" There is always the possibility that the tutor gets the help itself wrong, of course, and this is a point I will take up later.

THE LEARNER'S USE OF TIME ON TASK

I think that computer-based tutoring may offer us a unique window from which to re-view an old topic: how learners use their time on task. As you know, there is plenty of evidence showing that one of the best predictors of learning outcomes is how long the learner spends on task. In fact, time on task bedevils empirical attempts to look at the efficacy of different tutoring regimes. Since any tutoring regimen that manages to keep the child on task longer is likely to enhance learning (provided it's quality time on task), it makes it difficult to establish any differential effects of different strategies of tutoring and to prove that specific details of tutoring strategies support learning. I will show how computer-based records of tutor and learner activity can be used to help us tackle these issues (though, as I said before, it might be hazardous to generalize any conclusions back to human tutoring).

The questions about how strategic the learner is in using time on task (e.g., working quickly when the learner has a strong feeling of knowing but taking time when unsure about what to do next) give us a window to study how the child regulates the tutoring environment in ways that relate closely to tutoring strategies in Reading Recovery.

I've been struck, on the recordings of Reading Recovery tutoring that I have been shown, by how you vary in your use of your lesson time with the learner. Sometimes the tutor seems to be trying to speed up or accelerate the child's activity; at other times the tutor leaves much more time for the child. From what I have read and been told, I suspect your changes in pace reflect your assessment about the child's level of mastery. If you feel the child has grasped the basics, you start looking for greater fluency and toward greater *automaticity* or whatever term you want to use. But if you are working in the 10% or so of areas in which you expect the child to be meeting and mastering new things, you may provide more space and time. So, there is this whole issue of how your use of the learner's time on task reflects your assumptions about where the child's learning is at. The explicit theory about the use of time that underpins Reading Recovery lessons is one reason why I got excited about the agreement between my own view of what's important in tutoring and Reading Recovery theory.

Earlier, I used the metaphor of a ballet to describe interactions between tutors and learners. In Reading Recovery lessons, it's much more like a musical medley! How does this fit in with when we look at children and how they regulate their time on task? Do you see what question I'm trying to ask? We want to know if, for example, some children spontaneously use their time on task to speed up when things look familiar, but to slow down when they are unsure. Do they help to meet the tutor halfway in regulating the use of lesson time? Are other learners less effective in this way in helping the tutor to construct a contingent learning environment? I believe we have not been able to address this kind of question before because we've just never been able to get to this level of detail in recording children's activities. Computer-based studies give us a window on this too. Even more important, once we've got this information we can ask whether the child's use of time on task relates to learning outcomes. Well, to make it worthwhile listening to the details, I'll tell you the answer to that is yes, it does relate to learning outcomes. So it is worth going into detail.

A FEELING OF NOT KNOWING, ZONE OF PROXIMAL DEVELOPMENT, AND SEEKING HELP

Often (I'm tempted to say always, but I'm not sure) in effective tutorial interactions, we're dealing with the gap between what children are starting to recognize as appropriate to a task—what sounds right, what looks right, what feels right—and what they think they themselves can currently do and achieve. They can recognize what is appropriate before they can produce it for themselves. I think this may be a constraint on the child's zone of proximal development (and maybe this is bound up with acceleration), and in tutoring, it is about keeping the child at that point at which they can just start to recognize things they can't yet quite manage. Then children become critical players in the learning process because they can judge the results of their own efforts.

I suspect something like that's going on, and I think the data we're getting from our tutors provide, or at least suggest, that this is a plausible point of view. And if it's true, it's enormously important because it defines contingent tutoring—creating a space for learning. It is a basis for successful task induction and a shared view of the task by tutor and learner—crucial elements of scaffolding. If the instruction given by the tutor is then both temporally and instructionally contingent, we get close to an ideal process. I hope this helps to explain why the recognition production gap, the feeling of knowing, and the learner's use of time on task are so enormously important for me and, I think, for Reading Recovery practice.

What's the clever thing during your problem solving when you have an absence of a strong feeling of knowing about what it is you are doing? What strategies do you have available? One of them (not the only one) is to look for help. It might be that you look for help through reading, by surfing the Web, or searching databases; it might be asking a friend or a colleague or a tutor. You look for additional information from outside. Each of these social search processes is, I suggest, an outgrowth of help seeking. You use different strategies, but all have to do with recognizing that it might be useful to de-center and open out from your own perspective to incorporate insights, information, views, and advice from outside. I wonder why we don't encourage children to seek help more in schooling? Do we really develop help-seeking skills in children in schooling? That's, again, a general question. It's not meant to be challenging or rhetorical. But it is bound up with this whole issue of what do we advise children to do when they don't have a strong feeling of confidence or there is an absence of a strong feeling of knowing.

THE QUADRATIC TUTOR

I mentioned earlier that one of the computer-tutoring studies we have done involved learning about polynomial expressions in math, although I'm not going to go into detail here about the niceties of quadratic and cubic functions and how we sought to represent and teach these in our computer-based tutor. We chose the domain because we knew that the age range we were dealing with (mainly 11- to 13-year-olds) hadn't yet been formally introduced to these concepts in their curriculum. We also suspected that only around about 10–15% would actually develop a real understanding of it. (This projection is based on early work from the Chelsea Maths group in the United Kingdom; I don't think the situation changed much in recent years.) We wanted to look at contingent tutoring in an area that was likely to present a challenge for everyone. So we could stretch our own theory to the limit, we also wanted to deal with relatively high-flying, high-mathematically gifted learners and with children who were still struggling with the basics. We deliberately chose a wide spectrum of performance to work with the computer-based tutor. To remind you, the tutor offers instructionally contingent instruction but only at the request from the learner. Decisions about if and when to seek help and most aspects of the timing and the pacing of the tutorial sessions are in the learner's hands. Success rates—how many problems they tackle, how long they take, and so on—are all due to individual differences from learner to learner.

If we've got the design of our tutoring roughly correct and predictions from contingency theory are borne out, it should follow, as I was saying earlier, that the contingent tutor should wrap around the learner. It should be the case that the different patterns of interaction between different learners and the tutor should reflect individual differences due to the learners. Just as if I was observing you with highfliers or strugglers and you were being contingent, I would expect only to have to observe you to be able to make some strong inferences about which kind of child you were working with.

Let me point out one crucial feature of QUADRATIC—this will be very important later. Although the tutor is designed to be instructionally contingent, it is not domain contingent at all. In other words, it works much like school teaching, achievement tests, and psychological experiments in that it confronts all children with the same sequence of problems most of the time. That, as you will see, places a very important constraint on how we should interpret the different performances of high- and low-achieving learners.

Before offering them tutoring, we tested all of the children on a good, reliable, and wide-ranging test of the precursors to the development of algebraic reasoning that was developed by Hart and her colleagues at Chelsea (see Wood & Wood, 1999). After the children had worked through the tutor, we did all the usual post-tests and looked for long-term retention of outcomes. This was a pretty classical pre-test, intervention, and post-test design.

If our expectations about contingent tutoring were to be confirmed, we should find that individual differences in the offline pre-test scores correlate highly with the online interaction measures with the tutor. They were. Taken together, the online measures produced a multiple correlation with test scores of over 0.8. This is almost as good as you would want from test-retest reliability. Indeed, I would argue that we're measuring the same individual differences as the test, but by different routes. It will not surprise you to hear that the learners who (on the offline test) knew more, achieved more, or had a higher aptitude for math[2] worked at a faster rate, made fewer incorrect moves, and sought help less often (but note that they also needed less help since they experienced fewer difficulties). They were also more likely to self-correct. Bear in mind that there was no attempt to force help onto the learner. The tutor did say "yep" or "nope" to correct and incorrect actions, but learners were left with 100% opportunity to self-correct and as much time as they wished to do so. So the more children knew, the more likely they were to self-correct. They were also more likely to seek help. We found this out by looking at how many times each learner sought help after an error. Higher scorers made fewer errors and they asked for help less frequently overall, but the likelihood that they would seek help after an error was higher. Put another way, lower scorers were more likely to produce whole sequences of errors, despite the fact that the system had given them feedback about errors. The high scorers, then, could self-correct more, and if they did not self-correct, the chances were that they would ask for help, leading to much fewer episodes of error on error.

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[2] I'm being completely neutral here with respect to those terms. We don't know why some learners were scoring high or low on the test. It could be opportunity, differences in motivation, native wit, or aptitude.

This seems to add up to really bad news for the children who are struggling to learn. I think that John Anderson is absolutely right in his conclusion that errors often impede learning. Our findings with DATA agree with others that have found a negative correlation between error rates and learning outcomes. Errors not only take time but they really do seem to detract from learning gains. Now, I'm not a Skinnerian and don't want to push this too far. Fred Skinner, if you remember, had an ambition to produce conditions for error-free learning and designed his early teaching machines with this goal in mind. But I don't think errors are all of a kind, and some may well be important en route to learning. Errors are, so to speak, in our mind and may not be in the mind of the child (who may simply want to try and see what happens, for instance, rather than solve our problem). So always put errors, when I use the term, in "scare" quotes. Errors can be a normal and important product of learning. For example, when a child is exploring and searching, he or she may make errors from a tutor's perspective, but what that child is finding out may be important to discovery of the nature of constraints in the situation. However, our evidence does, I think, show that persisting in errors in the face of feedback (saying what one is trying is not working out) inhibits learning. Some of our children produced as many as 30 unsuccessful attempts in a row, presumably guessing. Yet they were facing a really complex bit of math that I really don't think they could possibly get right alone.

One implication is that these children will be more difficult to tutor because they will be giving much less clear signals as to when they themselves feel that they need help. They are certainly going to help the tutor less by not self-correcting—which is one of the jewels in the crown of learning as far as I'm concerned. It acts as a clear sign that the child is recognizing the significance of the effects of his or her own actions—a form of metacognition or knowledge of one's own cognitive activity. Self-correction is a real sign of strategic self-regulation in progress.

So with QUADRATIC it seems that the children who were struggling most with the tutorial tasks were the ones most likely to score as lower achievers on the initial tests. Are their apparently poor strategies for regulating the learning environment one of the reasons why they are low achievers in the first place? Are we uncovering here the process that explains why they are low scorers—because they aren't very good at engaging with and regulating their learning environments? Good question; I'll return to the answer later.

IS WORKING FAST A SIGN OF EFFECTIVE LEARNING?

Children who know more, as we have seen, work faster, work more accurately; they're more autonomous, and as we know from pre- to post-test gains, they're making faster gain rates on the specific things that they've been tutored in—all good, classical stuff. The more you know to start off with and given equal time to another child who knows less, the more you're likely to learn in comparison. So does it follow then, that *better learning* is fast, error free, and autonomous? Is that what we want children's behavior to look like? Certainly, from my experience of commercially available computer-based learning environments (and games), it seems that they set out to encourage and reward fast, error-free performance. Does it follow from our results that problem solving that is fast, error free, and autonomous can be taken as a sign as of better learning?

No, it does not. It is quite possible that we find an association between the magnitude of learning outcomes and performance with the tutor because higher achievers work faster and also learn more. It does not follow that working faster is what *causes* better learning. In fact, you might simply be measuring individual differences in prior knowledge with a different set of measures—speed, self-correction, autonomy, and so on. It's quite important, this. If I don't get this across, it makes what I want to say to end this talk impossible to make sense of. Let me try to explain the issue from another angle.

Imagine that there are two children with exactly the same test scores on a prior achievement test. These two children go on to work on the tutor, and one learns more than the other. Was this the child who worked faster or slower? In fact, it is more likely to be the slower of the two. Statistically, you can work this out for the whole group of learners by factoring out the association between prior knowledge and learning outcomes and then looking to see how interaction with the tutor relates to outcomes. When you do this, you find that better learning outcomes are generally associated with a slower rate of working with the tutor. So, if anything, we might want to advise any child who is struggling to solve problems to slow down, not to speed up.

I don't think we've ever been able to address the question about how prior knowledge, learning under tutoring, and learning outcomes all relate to each other in such depth and detail before. It's one of the advantages of working with computer-based systems. Whether or not the same findings would hold true in face-to-face tutoring, I can't say. I will have to leave you to make up your own minds without any useful evidence. However, I suspect that, in the present company, we are going to agree that the relationship between the kind of learning outcomes we are looking at and the moment-to-moment microstructure and the timing of learning under tutoring is crucial.

Learners who learned more (after individual differences due to test scores are partialled out) not only worked more slowly with the tutor, they also avoided staying locked in an impasse and avoided error by seeking help. The impact of seeking help rather than risking error on error was in fact significant for the lower achievers. So here's real evidence that seeking help was actually more important for you if you're a struggler. It is also good news for us because it suggests that our helping helped. It had a beneficial effect on learning. It also follows from this that children can't have been abusing online help. If they were, we would expect either to find no relationship with learning outcomes or a negative one (because they'd be using the tutor to avoid putting effort into learning, i.e. cheating). It is what I had suspected: as soon as the child has enough of a clue to work on, he or she will work on it to generate answers.

Finally, some thoughts about children's use of time on task. See if this is part of your intuitions: it will come as no surprise to find that higher-achieving children get their right answers to a question more quickly than lower scorers (does this imply that low scorers are, quite properly, giving themselves more time to respond?). What about wrong answers: do these tend to be faster or slower? They are faster. In fact, for over 90% of the children, error times were faster than correct responses, and higher achievers made faster errors than lower achievers. I find this really quite puzzling. Does it mean that errors come from impulsive behavior? Are the higher achievers, then, more impulsive? Or is it the case that children look at a problem situation, recognize very quickly that they don't know what it demands, and resort to search or trial and error? I can't say, though we think it is more likely to be the latter explanation. More importantly, we find that the average time to seek help with QUADRATIC took longer than either errors or successful moves. This, for me, implies that thinking before deciding to seek help is going on. Learners are generally taking time to think about the problem before asking for help. If you agree, it implies that as a tutor, you need to ask yourself if you leave enough time for children to decide to seek help before you provide some help! Also, ask if you leave enough time for attempts at self-correction after an error.

DATA: ARE LOWER ACHIEVERS GENERALLY POORER AT REGULATING THEIR OWN LEARNING ENVIRONMENT?

We have just completed a series of studies using another contingent tutor, DATA (for dynamic assessment and tutoring in arithmetic). We developed this tutor to see if we could get a grip on domain contingency. DATA is designed to assess each learner's stage of development in the mastery of basic concepts of number, addition, and subtraction. After a detailed online assessment, it offers a tutorial program that is contingent upon each child's pattern of task mastery, offering problem-solving experiences that are tailored to each child's performance. DATA always starts out from the simplest problems that each child seems to be having difficulty with and then moves on to more advanced problems on the basis of each child's performance with the tutor.

If DATA succeeds in achieving a degree of domain contingency, then we should expect to find that the relative levels of difficulty of the tutorial problems it sets for each learner map on to individual differences in math achievement. We have tested the tutor extensively, and we are confident that this is the case. So we have some evidence that it is possible to design and implement principles of domain contingent tutoring—a tutor that wraps around learners by finding tutorial tasks that fit their current levels of knowledge and achievement.

But the main reason for presenting DATA to you today are some surprising findings about help seeking, self-correction, and the use of time on task by high and low achievers. Basically, when we look at these performance characteristics of children in DATA—where we achieve a degree of domain contingency—we find no differences associated with prior achievement. *Low scorers were just as likely as their higher-scoring peers to seek help, to self-correct, and to work at a slow or fast pace with the tutor.* Children who work more slowly with the tutor, as in QUADRATIC, tended to achieve more successful problem solving, but the rate of working on the tutorial problems was quite independent of prior achievement.

These findings, which we had not expected, are really quite important if they can be generalized. They indicate that low achievers are not, as we had thought, generally poorer at regulating the tutor or their own learning.

When you look at the literature on face-to-face interaction and help seeking, it all points in one direction: low achievers tend to be poorer than higher achievers at self-regulation—particularly in help seeking and self-explanation. This leads to the general and widely held idea that self-regulation plays an important part in *causing* such individual differences, which is what I believed. Our findings from DATA bring this idea into question. Why are our findings so different from other work in this area?

In every single study in the literature that I have looked at, nobody has honored the demands of domain contingency. And that's because we do experiments. In experiments, we want to compare like with like, so we give every participant in the experiment the same task. In fact, if you don't make sure that all your participants receive the same treatment, editors may refuse to publish you on the grounds that the data are tainted by bad experimental hygiene—as I have found to my cost. We need ways out of this situation if we are to avoid potential pitfalls like our (invalid) generalizations about learning and metacognition. In experiments, test situations, and in much teaching, all learners receive the same problems, similar kinds of help and, perhaps, similar amounts of time to work on tasks. This means that learners who know less to start with are essentially faced with harder problems to solve than ones who know more. If, as seems likely, they turn out to show evidence of poorer help seeking or less acute knowledge of their own knowledge and skill, how should we interpret their problems? Are such differences due to something that's *inside* learners, in terms of weaker strategies of self-regulation or whatever? Or is it just down to the fact that they are more confused and uncertain by problems that are more difficult, experience less frequent success, and get help that is not contingent on their real problems? Each of these states of affairs could arise if any learning situation lacks domain contingency. Perhaps, then, DATA portrays a different picture of children learning because it provides the only situation in which each learner is compared with others when each is working on problems that are contingent upon individual levels of task mastery.

In Reading Recovery, of course, you strive to achieve domain contingency all the time. You adapt and adjust the demands of reading and writing tasks to fit your records and knowledge of each child. You don't work children through a single program or expose all to the same learning sequence. You adjust and adapt the demands you place on the learner in an effort to achieve a level of challenge that is appropriate to each: you are contingent, or you strive to be. So you should be well placed to think about, digest, and, if you feel the need, to evaluate and challenge what I have been saying. Do you find, for instance, that when you adjust the levels of demand in reading and writing situations to the needs of each learner, you find no obvious connection between effective regulation of learning (help seeking, use of time on task, self-correction) and children's levels of prior achievement? Of course, individual children will vary one from another in these aspects of self-regulation, but is it the case, as with DATA, that such individual differences are quite independent of prior levels of achievement? If so, the educational and psychological implications would be really quite important. Are you willing to help us find out if, like me, you were attributing to poor learning skills in children what might really be due to our lack of knowledge about the what, when, and the how of tutoring?

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You go to b ab t rod the 16 levo *[You got to be able to read the 16 level]:* Derek's Literacy Learning Story in First Grade

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ABSTRACT

This paper examines the co-constructed nature of classroom life, and what became constituted as one child's story of literacy learning in first grade. It takes an over-time look at how opportunities for literacy learning were constructed within multiple, intermingling contexts (classroom, school, district, and family). Derek's literacy learning story illuminates and illustrates the nature of (a) literacy learning as a negotiated process across multiple layers of context, (b) teaching decisions addressing an individual child as negotiating multiple perspectives and expectations, and (c) a definition of literacy as constituted by the negotiation of contexts, perspectives, and expectations.

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Literacy learning in classrooms is a complex and problematic construct (Green & Bloome, 1997). A large body of research has contributed to different understandings of its nature and processes (Bloome, 1987; Clay, 1991; Cook-Gumperz, 1986; Ferreiro, 1990; Moll, Amanti, Neff, & Gonzalez, 1992, among others). Recent studies grounded in a sociocultural perspective have provided new theoretical and methodological lenses to examine literacy learning, teaching processes, and the nature of classroom life (e.g., Cochran-Smith, 1984; Collins & Green, 1992; Dyson, 1993; Heath, 1983; Solsken, 1993; Weade, 1992). Yet the dynamic nature of curriculum co-construction and what becomes constituted over time and across contexts as children's stories of literacy learning continue to need further examination.

As Weade (1992) put it, the "tensions created for students, teachers, and others who somehow manage to juggle the inherent contradictions in conflicting ideologies of classroom practice remain relatively unexplored" (p. 90). Few studies have taken a more comprehensive look at the interplay among the contexts in which literacy learning takes place (Cochran-Smith, 1984; Heath, 1983; Solsken, 1993). In the current political climate in education, there is a push for national standards, national education goals, and accountability measurements; and these demands create new tensions not only for teachers and administrators but also for students and their families. However, how the development of state- and district-level standards and assessments could shape and constrain what counts as literacy learning and teaching in the primary grades remains to be examined. Empirical research is needed that further extends a situated perspective (Green & Bloome, 1997), and examines the current interplay of local and larger contexts (for example, high-stakes assessments, mandates from legislatures, state-level guidelines for language arts programs, district-level guidelines, and proficiency standards) and their impact on the nature of literacy learning opportunities taking place at the classroom level. The purpose of this study was to examine the co-constructed nature of classroom life, and what became constituted as one child's story of literacy learning. To explore dynamic, rather than static, ways of examining classroom practices and the interplay of local and larger contexts, I took a comprehensive, over-time look at multiple contexts (classroom, school, district, and family) as opportunities for literacy learning were constructed in one classroom.

CONCEPTUAL FRAMEWORK: THEORY AS CONTEXT FOR INQUIRY

A sociocultural perspective on the nature of learning and literacy learning formed the mental grid (Zaharlick & Green, 1991) or theoretical framework for this study, thus suggesting ways of conceptualizing literacy learning, guiding methodological assumptions and decisions, and creating a context for inquiry. From a sociocultural lens, literacy and the nature of the cognitive processes involved in learning to read and write are constrained and shaped by socially constructed meanings and literacy practices. Scribner and Cole (1981) emphasize the socially organized nature of literacy practices as a process in which we learn not only how to read and write a specific script but also how to apply this knowledge for specific purposes in particularized contexts of use. Rather than being viewed as a fixed set of universal cognitive processes or an individual act and accomplishment, literacy learning and teaching is discussed within the social, cultural, historical, and political contexts in which it occurs. Further, literacy is viewed as encompassing multiple literacies (with multiple ways of being literate) instead of a single definition of literacy. Literacy involves varied discourses, ways of using language, and participating in socially and culturally situated practices and actions that can vary across situations both within and across settings, cultures, and communities (Bloome & Green, 1992).

Classroom-based ethnographic studies have described ways in which children socialize in particular literacy practices and literacy communities within the classroom (Kantor, Miller, & Fernie, 1992; Santa Barbara Classroom Discourse Group, 1992). Taking a situated perspective (Green & Meyer, 1991; Heap, 1991), these studies view literacy learning and teaching processes as located within the ongoing stream of everyday classroom life. Learning and teaching processes are described as taking place in a complex and evolving social context and are situationally defined in the patterns of classroom life co-constructed by teachers and students in their particular classrooms (Collins & Green, 1992; Weade, 1992). In this study, building on a situated perspective, I take a more comprehensive look at literacy learning processes to empirically examine the larger series of contexts (and texts) that students draw upon as resources and frames to guide learning, meaning making, and participation in classroom literacy practices.

METHODOLOGY

The processes of data collection and analysis were guided by an interpretive approach (Erickson, 1986; Gaskin, Miller & Corsaro, 1992) and ethnographic perspective (Cochran-Smith, 1984; Zaharlick & Green, 1991). An interpretive approach to inquiry best suited this study's questions and conceptual framework because of its focus on phenomenon and meaning making as situated historically, socially, and culturally (Graue & Walsh, 1998). I adopted an ethnographic perspective because of its sociocultural substantiality (Hymes, 1982) and its focus on making visible the nature of literacy learning processes as constructed by and from the perspectives of classroom members (teacher and students). I also used the concept of intertextuality (Bloome & Egan-Robertson, 1993; Floriani, 1997) and a dialogic view of the interdependence among contexts (Rogoff, 1995) as frameworks for analyzing and interpreting the interplay and influence of multiple contexts (and their texts) in the nature of co-constructed literacy practices. I viewed classroom literacy events or practices as texts, written by students and teacher in and through their oral and written actions and interactions (Collins & Green, 1992). Further, texts not only consist of oral and written forms, but also can be read and written through other types of symbols and actions embedded in social practice and institutions that affect the ways in which classroom literacy practices are defined. Thus, I examined literacy learning as representing the juxtaposition of multiple contexts and the texts written by the learner through that learner's actions and interactions within classroom literacy practices and other experiences outside the classroom. As Lemke (1995) emphasizes, a text [and context] is not "complete or autonomous in itself: it needs to be read, and it is read, in relation to other texts [and contexts]" (p. 41).

In this study, I examined the processes involved as one student gained access to and actively participated in classroom literacy practices and how opportunities for literacy learning and teaching were co-constructed by classroom members. I also investigated how this student made sense of and engaged in literacy practices at the individual and collective level. Of particular interest was how opportunities for literacy learning were constructed over time and across contexts (i.e., classroom, school, district, and family). These questions served as preliminary frames for my data collection and analysis.

Context of the Study

This closer look at the literacy learning story of one student, Derek,* is part of a larger, yearlong study investigating literacy learning and teaching processes in a first-grade classroom (Dantas, 1999). The data were collected in a K–4 public school serving a lower- to lower-middle-income community located in a small Midwestern city (19,000 population). The school, which is a professional development site affiliated with a large university, has a history of child-centered education and a focus on integrated and literature-based curriculum. The teacher, Julie Boyd, has lived in the school's city for over 20 years and has taught in the school for 14 years. She is an experienced teacher who viewed the research project as an opportunity for professional development and reflection on her teaching. Mrs. Boyd started the year with a group of 26 students and ended with a group of 23 students. A total of 27 students participated in this study. During the first month of school, Mrs. Boyd and I selected a group of seven focal students using maximum variation sampling (Patton, 1990). The stories of each of the seven focal students were unique and complex; however, limitations on the scope of this study led me to focus on the story of one student. Derek lived with his family (mother, father, and younger brother) and had attended kindergarten at this school. He lived outside the school's attendance area, and his parents drove him to school every day. His mother was actively involved in the school's parent and teacher association, and both parents worked hard at their own private business in order to maintain the family's lower-middle income.

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* Pseudonyms have been used for the names of the student and teacher to ensure confidentiality.

Data Sources

The process of data collection took place before the school year began while classrooms were being set up, and it continued until the end of the school year. I used a range of ethnographic tools to collect data in the classroom: participant observation, field notes, video and audio taping, informal interviews with students and teacher, collection of documents and artifacts, and photographs of classroom activities. I also observed particular school activities, collected school and district documents, and met with families formally and informally at home and at school. Data sources include (a) classroom observations for 63 days; (b) observations of school activities over the school year including staff meetings, recess activities, the school's Early Reading Intervention program, and specials; (c) journal writing with the teacher (notebook form and e-mail communication); (d) one visit with the teacher to Derek's home and two interviews with Derek's mother at school; (e) informal contact with Derek and his family after school or at school events (open house, parent night, family literacy night, parent conference, student-led conference, one field trip, Kids Invite Someone Special [K.I.S.S.] tea day, and field day); and (f) school, district, and state documents.

Data Analysis

The data analysis involved a recursive, iterative (Graue & Walsh, 1998), and ongoing process. This process informed data collection decisions in terms of why and when to collect data as well as how and which data collection procedures to use. It involved varied levels of analysis within a reflexive process of interpretation that illuminated the multiple meanings (Denzin, 1994) of an action, interaction, event, or artifact. Contextual validation (Lincoln & Guba, 1985) was possible through the triangulation of multiple data sources. Prolonged engagement, persistent observation, triangulation, member checking, and peer debriefing were techniques used to establish the credibility of findings and interpretations.

This study focuses on two levels of analysis: the identification of the layers of context and discursive practices that shaped classroom interactional spaces and the analysis and juxtaposition of the interaction among contexts by tracing one child's literacy learning story. The concept of tracer units (Dantas, 1999; Kantor, Elgas, & Fernie, 1993) is used as an interpretive element and analytical tool to examine the influence of multiple contexts (and texts) on the nature of literacy learning as it is co-constructed over time. Highlighted in this analysis are two themes: the multilayered and interdependent nature of contexts in which literacy learning is embedded and situated and the negotiated, co-constructed, and situated nature of classroom opportunities for literacy learning. See Dantas (1999) for a more detailed description of each layer of context examined and the organizational patterns of classroom interactional spaces (Heras, 1993) involving literacy events and practices, as well as an analysis of three tracer units, which examine other important aspects of classroom literacy practices (a group event, a curriculum piece, and assessment).

FINDINGS

In this section, I briefly describe the contexts that influenced and were used as frames of reference in the opportunities for literacy learning created in the classroom. I then describe and discuss Derek's classroom and school life and his experiences outside of school. Derek's story is used as a snapshot taken in the flow of classroom life that allows us to examine the nature of the contexts in which literacy learning is embedded and situated, as well as how a particular child engages in and constructs opportunities for literacy learning.

What Counts as Learning Context

A definition of classroom context as multilayered is critical to the understanding of the nature of literacy learning in Julie Boyd's classroom. Throughout the year, opportunities for classroom literacy learning and teaching were supported and constrained by all contexts outside the classroom and by interactional spaces (Heras, 1993) built inside the classroom. Interactional spaces involved shared meanings and definitions of social appropriateness marked by distinct patterns of organization of time and space, use of materials, purpose, and interactional norms (Cochran-Smith, 1984) and forms of discourse and social activity. They were created and constituted in relation to, embedded within, and taking into account the district, community, family, and school contexts. For example, in the classroom's meeting area, literacy events such as independent reading time and read-aloud activities followed predictable participant structures (Phillips, 1972), or ways of participating socially and linguistically, in which literacy practices were introduced and practiced at the individual and collective level. In these interactional spaces, literacy learning took place along with an evolving classroom community in which students and teacher in interaction became contexts for each other (Erickson & Schultz, 1997).

The contexts outside the classroom include societal influences such as sociocultural values, the history of public education in the United States, the national standards-based reform movement, the National Assessment of Educational Progress (NAEP), national and state legislation, the public debate over whole language versus phonics approaches to reading instruction, and other influences. In this study, the focus was on three layers of context outside the classroom: the district, the family (and community), and the school. The classroom context and the ways in which literacy was framed and defined (through opportunities for literacy learning and teaching) were embedded and situated within these outside layers. Figure 1 displays these contexts as physical spaces. Dashes are used to indicate communication between contexts although they do not fully illustrate the permeability and co-constructed relationship among them which is addressed in the analysis of Derek's literacy learning story. The classroom is situated in the center in order to display its embeddedness within other contexts.

There is a level of hierarchy between the district's decisions and guidelines and the school, classroom, community, and family contexts. For example, assessment requirements and new reading and writing proficiency standards determined the school and classroom's assessment schedule and selection of assessment measures. In addition, raised writing and reading proficiency standards (e.g., increasing the benchmark text reading level for end-of-year first grade from 12 to 14) distributed the pressure of preparing students for the fourth-grade reading proficiency test among all the primary grade teachers. These new standards created new tensions for families and students who became concerned with reaching specific book levels and meeting proficiency standards. The district's decisions were themselves a response to state-level guidelines on language arts curriculum, legislation on proficiency testing, and a fourth-grade reading guarantee (i.e., students who fail the reading portion of the state's fourth-grade proficiency test will be retained).

Nevertheless, in the interactional spaces built in the classroom, the teacher had many choices in her ongoing decision making, and students had the power to choose how to respond and interact in the classroom. Briefly described, Julie Boyd's daily decision-making process involved the orchestration of the district's course of study and assessment requirements; the school's philosophy, schedule, and resources; her students' interests, backgrounds, and needs; their families' expectations and backgrounds; and the organization of the classroom's physical space, time, and available material and human resources. This decision-making process was guided by her frames of reference (Green & Weade, 1987); theoretical and practical understandings of classroom practice, child development, and learning; and curriculum goals. At the same time, in the ongoing process of curriculum enactment, the students' frames of reference (e.g., interests, personal history, and literacy background) and their responses and needs (as determined by formal and informal assessments) also played a critical role.

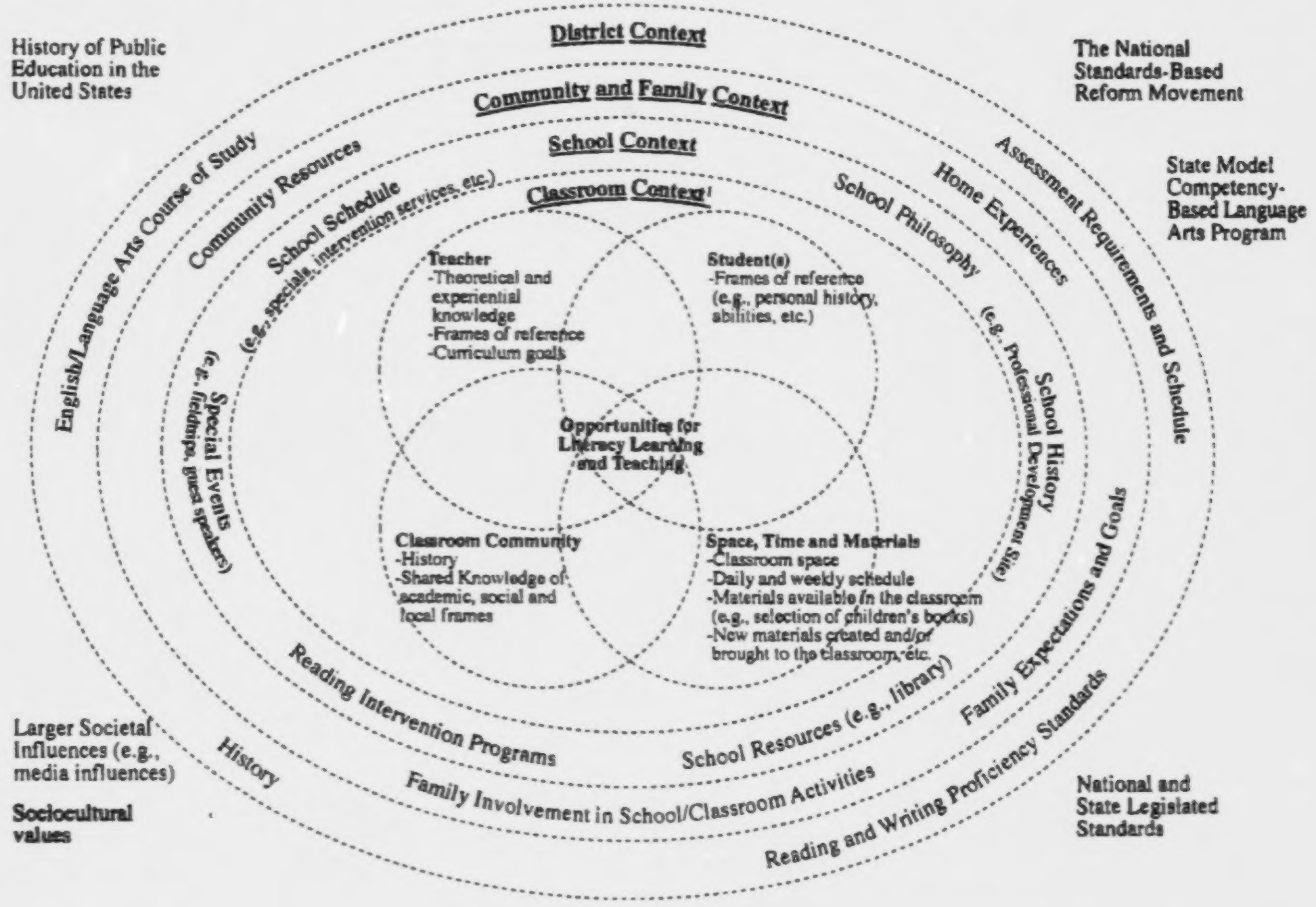
Over the school year, Mrs. Boyd and her students became a classroom community who shared academic, social, and local knowledge as well as a history. Being part of a classroom community or social group involved the construction of local or situated meanings, and common knowledge of the roles and relationships, rights and responsibilities, and norms and expectations of appropriate participation in the classroom (Zaharlick & Green, 1991). Local and shared meanings allowed the implementation of and participation in daily or weekly classroom routines and activities (e.g., planned literacy events) and literacy and social practices. Classroom space, the daily schedule, the materials available in the classroom, and new materials also influenced the construction of local meanings and opportunities for literacy learning. As Figure 1 illustrates, opportunities for literacy learning and teaching were embedded within interactional spaces co-constructed and framed by the teacher, students, and classroom community within specific classroom spaces, materials, and time.

In the classroom, literacy learning and teaching were an important part of the complex web of personal and temporal interactions (Graue & Walsh, 1998) making up the classroom's daily life. Opportunities for literacy learning at the individual and collective levels took place in daily classroom practices in ongoing interactions between students and teacher and were not limited to those practices involving reading and writing. They were situated within interactional spaces created by the teacher, students, and classroom community (in particular, classroom spaces, materials, and time). These opportunities were embedded in a socially evolving context that reflected the district and state, the school, and community and family perspectives. Thus, what became constituted as the local space or learning context through the interactions and actions of classroom members at both the individual and collective levels reflected many texts and frames of reference related to what is defined as literacy learning.

Intermingling Contexts: Derek's Experiences at Home, School, and in the Classroom

Derek's story allows us to weave themes and portray the big picture of how they are interwoven. I trace Derek's literacy learning story by looking at (a) his life as a first grader, (b) his learning experiences outside school, (c) his family concerns and involvement, and (d) his interactions and relationship with his teacher. By tracing Derek's classroom life, I locate his literacy learning story within the web and ongoing stream of classroom life. Like Julie Boyd's decisions and actions (see Dantas, 1999), Derek too negotiated multiple layers of context located within the interactional spaces built at the classroom level and outside the classroom (i.e., his family and community, the school, and the district's proficiency expectations). His identity as a learner, reader, and writer in the classroom was

Figure 1.


History of Public Education in the United States
The National Standards-Based Reform Movement
State Model Competency-Based Language Arts Program
Larger Societal Influences (e.g., media influences)
Sociocultural values
National and State Legislated Standards
District Context
Community and Family Context
School Context
Classroom Context
English/Language Arts Course of Study
Community Resources
School Schedule
(e.g. specials, intervention services, etc.)
Special Events
(e.g. fieldtrips, guest speakers)
Assessment Requirements and Schedule
Home Experiences
School Philosophy
School History
(e.g. Professional Development Site)
Family Expectations and Goals
Reading and Writing Proficiency Standards
School Resources (e.g., library)
Family Involvement in School/Classroom Activities
Reading Intervention Programs
History
Teacher
-Theoretical and experiential knowledge
-Frames of reference
-Curriculum goals
Student(s)
-Frames of reference (e.g., personal history, abilities, etc.)
Opportunities for Literacy Learning and Teaching
Classroom Community
-History
-Shared Knowledge of academic, social and local frames
Space, Time and Materials
-Classroom space
-Daily and weekly schedule
-Materials available in the classroom (e.g., selection of children's books)
-New materials created and/or brought to the classroom, etc.

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constituted and co-constructed by the interdependence among multiple contexts. His parents' image and expectations of what constituted literacy learning were also situated and co-constructed within multiple layers of context. In this sense, it is necessary to take an over-time look across contexts to understand what becomes constituted as one story of literacy learning.

Figure 2 briefly summarizes the range of Derek's experiences in the classroom and at home and school over time. Although this figure separates Derek's experiences into three categories, in reality, Derek's literacy learning was supported and shaped by his actions and interactions in these contexts. In other words, Derek's literacy learning was influenced and shaped by his prior knowledge, personal goals and interests, his parents' involvement in school and classroom activities, his relationship with Mrs. Boyd, his participation in the Early Reading Initiative (ERI) program, his involvement in Cub Scouts, and other important events in his life.

Derek's Life as a First Grader

When asked to write a letter to kindergartners about first grade during one of the last days of school, Derek wrote about things he liked to do such as the climbing wall in gym and his favorite math tub, the interlocking cubes (see copy of Derek's writing, page 13). He also wrote about things he did in first grade (i.e., work on math computers and do work). Derek did not forget to include in his letter that the kindergarten students would be expected to read at Text Level 16 in the following year—two text levels higher than the benchmark while he was in first grade. For Derek, being able to read at Level 14 (the benchmark when Derek finished first grade) became a personal, family, and teacher goal in his life as a first grader.

Derek seemed well adjusted and comfortable with school and classroom routines and activities from the beginning of the year. However, at home he shared mixed feelings about going to school and continued to complain during his first month in school. As his mother wrote,

> *Response to Parent Survey, August 1998*
>
> [Derek]...tells us that he does not want to go to school because it is boring and he has to do "work." [He]...is also concerned because his favorite friends from kind. [Kindergarten] are in other classes and a child he "clashed" with will be with him again. He tends to be shy with his peers until they seek him out....Deep down inside I think he loves the social aspect of school and he loves to "show off" new knowledge at home. (He can't wait to try out the new climbing wall—ironic because he has a mild fear of heights)

Figure 2. Intermingling Contexts: Brief Overview of Derek's Experiences at Home, School, and in the Classroom

First-Grade Year	Derek's Experiences		
	Home	**Classroom**	**School/District**
Fall	- Background experiences and interests: following "how to do" manuals and putting things together; science; nature; arts; etc. - Parents concerned with his literacy development after receiving his early assessment scores, and being notified about his referral to ERI. They share concerns about the fourth-grade proficiency test. - Regularly completing his classroom and ERI homework assignments. - The topic of his conversations with his parents about school focused on new friends and their play during outside recess or lunch. - Derek joined Cub Scouts. - During his grandmother's visit, he read an ERI book to her. - He received for a birthday gift a radio to put together with his father. - Home visit from Mrs. Boyd and Malu. - Before Christmas, he was involved with his family in writing his gift list and signing cards.	- Being tested in reading, writing, and math in his first day of school. - Developing friendships and a relationship with Mrs. Boyd. - Long bathroom breaks before starting individual assignments (especially writing assignments). Rereading same book many times during quiet reading time. - Active participation in classroom meeting discussions and science and art projects. - Favorite things (all year): playing with math tubs, playing games in the computers, and talking about his outside school experiences. - Sharing Cub Scout uniform with Mrs. Boyd, classmates, and Malu. - Taking home personal notes from Mrs. Boyd (e.g., thank you notes). - Present with his mother at the parent informational night. - Field trip to the supermarket with class and a group of parents (including his mother).	- Mixed feelings about school. - Low scores in the early reading and writing assessments. - Referral to the school's Early Reading Initiative (ERI) program. Being part of a group of five students being served by the ERI pull-out program. - Developing friendships in the playground and specials (e.g., arts, gym, library). - Participation in PTA events (e.g., skate party). - Present with his classroom and other classrooms at the presentation of a guest speaker (i.e., a Bee specialist).
Winter	- Regularly completing his classroom and ERI homework assignments. - When talking about school experiences with his parents, he started to focus on classroom activities. - Realizing that words are made out of letters. - Parents excited about his growth in reading. - Meeting Cub Scout goals: reading and memorizing parts of a book, and having it be read by different adults at home and at school. - Valentine Day: signing cards for his classmates.	- Finishing up assignments quickly in order to play with the math tubs, especially the interlocking cubes. - Realizing that words are made out of letters. Writing longer stories and attempting new words. - Student-led conference—setting up reading and writing goals with Mrs. Boyd and his mother for the rest of the school year. - More interest in quiet reading time, and attempting to read different books. - Bringing his new Cub Scout book to the classroom. - Bringing a volcano experiment, which was used in the classroom's rainforest unit.	- School is a more comfortable place. - Participation in PTA events (skate parties). - Graduating from ERI program. - Participation in reading group meetings with students from Mrs. C's first-grade classroom.
Spring	- Regularly completing his classroom and ERI homework assignments. - Starting to read chapter books. - Parent share concerns about the fourth-grade reading proficiency test.		- Field trip to the city's conservatory with his class, two second-grade classrooms, and a group of parents (including his mother). - Guest speaker/ focus: rainforest. - Participation in PTA events (e.g., spring festival). - End-of-the-year assessments: Reached the district's reading proficiency standard; did not reach the district's writing proficiency standard. - Last days of school: participation in ERI with a group of five students, who were also reading at grade level, to enhance reading skills.
End of the Year/ Summer Plans	- Parents' goals: to review information learned during the school year, read books, take part in a play directed by his mother, camp with his family, etc. - One of Derek's goals for the summer: to teach his younger brother about kindergarten and first grade.	- Reaching reading goal, and developing sense of confidence as a reader for being able to read a chapter book. Writing more elaborate stories and attempting to write new words. - More interest in reading different books in the classroom.	

Making friends was a concern for Derek during the first months of the year. He interacted with a variety of students in the classroom and during other school activities. During free choice time, he started to establish closer relationships as he played with the interlock tubs, looked over the shoulder of a classmate who was playing at the games computer, shared his handmade flashlight with Nathan, or talked about his Cub Scout experiences.

Derek's scores in the early reading and writing assessments were among the lowest in his classroom. Based on his scores on four literacy tasks of Clay's (1993/2002) Observation Survey (letter identification = 41, writing vocabulary = 2, hearing and recording sounds in words = 1, and text reading level = A), he was referred to the school's ERI program. From September until March, he left the classroom every morning with a group of four other students. They stayed at the ERI program's room for half an hour, during part of the early morning's quiet work choice time (i.e., reading group, math computer, morning work choices, or learning centers) and the beginning of meeting time (i.e., shared reading, read aloud, interactive writing, calendar activities, and instructions for morning work time).

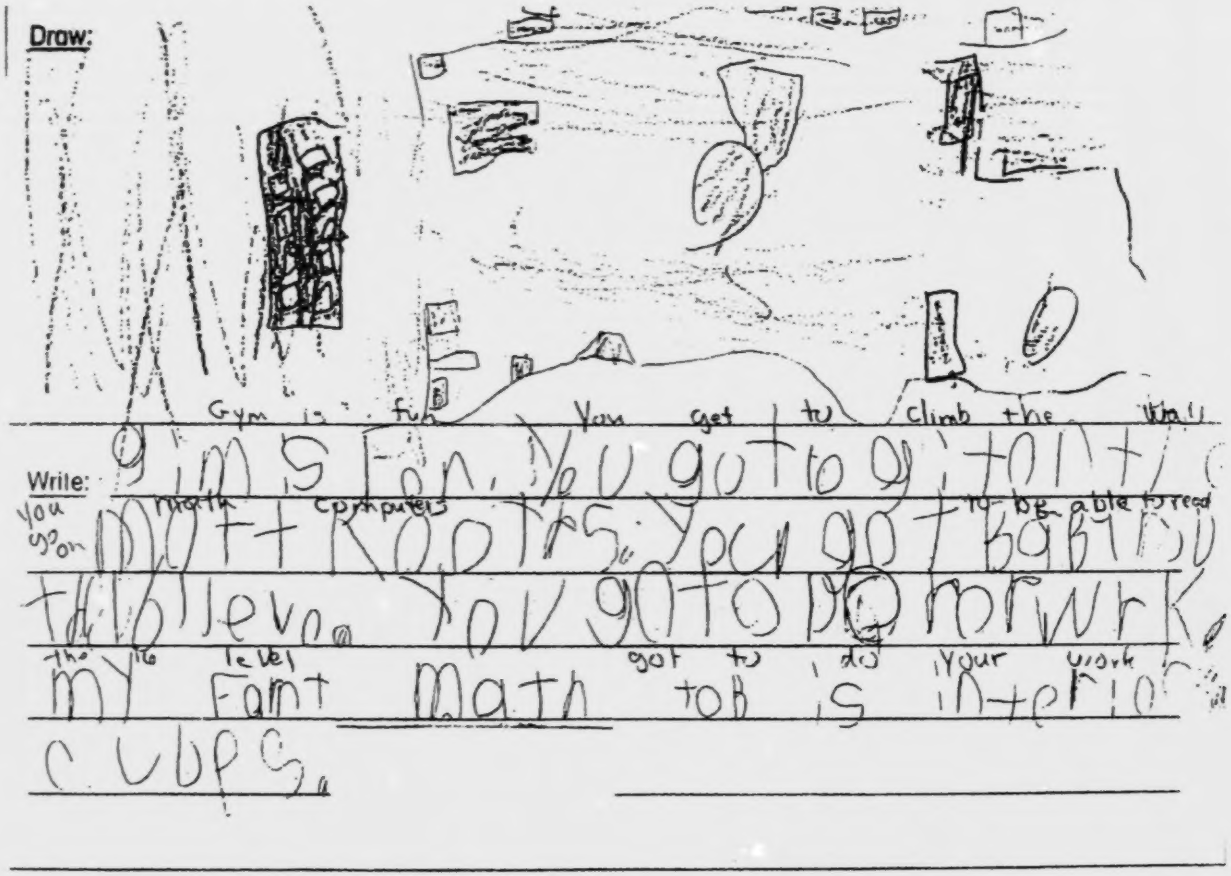
Reading children's literature books and writing were not on Derek's list of favorite things to do. Although Derek had access to books at home and often used procedural books or manuals as well as computer games, he did not see himself as a reader at the beginning of the school year. Additionally, early in the school year, Derek was reluctant to write. He took long bathroom breaks before writing assignments during quiet work time. During quiet reading, he hesitated to attempt to problem-solve words in a new text, and he often reread the books he was using in the ERI program. Derek constantly participated and contributed in classroom conversations. He often volunteered to answer questions, especially when they related to science and math content. For example, as Mrs. Boyd describes, he actively participated in group conversations during the unit on penguins:

> *Journal Writing, February 1999*
>
> [Derek] is enjoying this unit—his knowledge about penguins is amazing and he doesn't hesitate to make sure I have all the facts straight or to verbalize it in another way.

Derek also enjoyed talking and sharing about his extracurricular activities. In our conversations, he liked sharing his experiences working with his father at the family's copy shop and his Cub Scout activities.

When asked if he liked to read and write, Derek was open about not liking these activities despite the progress he had made by the end of the school year. Learning to read and write in order to achieve school proficiency standards was mostly a family goal for Derek. He set goals and celebrated his progress with his

Figure 3. Copy of Derek's Writing



Draw:

Write:

Gym is fun You get to climb the wall
gim is fon. You got to gi tolnt
you go on math computers to be able to read
matt Kootrs. You got babrdu
the 16 level got to do your work
th 16 levn. You got to do orwrk
my Famt Math tob is interio
cubes.

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parents. For example, late in the winter he shared with me his conversation with his mother about his graduation from the ERI program.

> *Audiotape, March 1999*
>
> I'm ahead on reading now. My mom said that I'm the only one that can read a book [in my reading group] and that my reading teacher told her that I'll be out of reading group soon.

In the classroom's weekly or daily routines, Derek participated in a range of literacy practices that fostered opportunities for literacy learning. These learning opportunities took place in (a) planned literacy events (shared reading, interactive writing, reading group, silent reading, independent writing, group projects, assessment tasks, computer programs); (b) theme-based units (activities which took place during planned literacy events, as well as integrated arts, math, social studies, science, and health); (c) planned math events (calendar, group problem-solving activities, independent math assignments, math computer program, and computer games); (d) planned social routines (attendance and lunch count, directions for quiet work time, identification cards for math computers, take home folders, distribution of handouts for work assignments, checking responsibility chart and morning quiet work choice chart, and writing personal cards); and (e) informal social routines (participating in games, sharing books and other written materials, writing, and drawing).

In the winter, Derek was able to make sense of the relationship between words and letters. He realized that words are made of letters. From his mother's point of view, this realization was the turning point in his literacy learning in first grade. He became more motivated to attempt to read new books, as he better understood how written text operates. At the same time, at the classroom community level, being able to read a chapter book became an important sign of status within the students' peer culture (Corsaro, 1985). Being able to read a chapter book became an important goal to Derek. As his mother explained,

> *Audiotape, June 1999*
>
> To him, those were real books...They're not those little baby books.

In February, during his conference with Mrs. Boyd and later in his student-led conference with his mother, Derek set as a reading goal to be able to read chapter books. Derek's responses to Mrs. Boyd's guiding questions (in bold below) were recorded in the same paper:

> **In reading, I would like to get better** *at reading chapter books. We* [Mrs. Boyd and Derek] *talked about how he'd need to know more words. He feels better about reading now.* [italics indicate what Mrs. Boyd wrote with Derek]

> **With your parents, set a goal for reading. What can you do at home to help reach this goal?** *Read* The Cat in the Hat *once every night. We would like to read a chapter book by the end of the year.* [italics indicate what Derek's mother wrote with him]

During the student-led conferences, he also set goals for writing with Mrs. Boyd and his mother. Derek's family involvement in his learning process is illustrated by the use of *we* in the goals set by him and his mother.

> **In writing, I would like to get better at** *make me know the sounds easier this would help me spell new words.* [italics indicate what Mrs. Boyd wrote with Derek]
>
> **Set a goal for writing with his parents. How can you accomplish this goal?** *We would like to know some new words by the end of the year and remember to put spaces in between the words.* [italics indicate what Derek's mother wrote with him]

Learning how to read only became Derek's personal goal when he was required by his Cub Scout group to read and memorize a sequence of paragraphs in his Cub Scout book. He read and repeated these paragraphs at home. At school he re-read them to himself, and he read them to a few classmates, to Mrs. Boyd, and to me. He also asked Mrs. Boyd to read a story from his Cub Scout book to the whole group during a shared reading classroom event.

According to Derek, he learned a lot in first grade. His end-of-the-year scores in four literacy tasks of the Observation Survey (Clay, 1993/2002) also confirm his progress (letter identification = 54, writing vocabulary = 39, hearing and recording sounds in words = 37, and text reading level = 16). During the last days of school, like other classmates, he was proud to share that he was able to read a chapter book:

> *Audiotape, May 1999*
> I'm reading chapters now…I finished one yesterday.

He showed me the book he had just finished reading, *Ghosts Don't Eat Potato Chips* (Dadey & Jones, 1992). Later he mentioned that he was reading his seventh chapter book. Nevertheless, when I asked if he liked to read, he answered quickly and emphatically:

> *Audiotape, May 1999*
> Ah…ah no, no. I don't like to read. No.

Derek's Learning Experiences Outside School

Derek's favorite thing to do outside school was to help his father in their copy shop. He wanted to be a "copier fixer" just like his father. During the summer prior to first grade, Derek enjoyed camping, fishing, swimming, biking, and spending time with neighborhood friends. He also spent a lot of time with his younger brother and enjoyed teaching him about things he knew. Derek enjoyed playing computer games at home and putting things together by himself (e.g., Lego toys) or with his father (e.g., putting together his birthday gift, a radio; helping or observing his father fix a copy machine at their print shop; learning how to make a handmade flashlight). He attended Sunday school and Adventure Club (a church program which involved choir practice), and in the fall, he joined Cub Scouts.

In November, during the home visit Mrs. Boyd and I made to Derek's house, he was excited to share his new Lego toys. He showed us the elaborate cars he enjoyed putting together by looking at the pictures and following the directions. During the school year, Derek was an important participant in Mrs. Boyd's science lessons. For example, during the penguin unit, he actively contributed to classroom discussions about penguins' habitat and characteristics. In the unit on the rain forest, he brought to the classroom his volcano kit, which was used as part of a whole group experiment led by Mrs. Boyd.

Derek enjoyed sharing things he brought from home. Late in September, Derek brought to school a handmade flashlight. He explained that his dad made the flashlight for him. He told me that his dad knew a lot about electricity and he taught him about it. In September, Derek joined Cub Scouts. He was proud to come to school with his new uniform. He told me that his grandmother bought it for him. He also shared that during his grandmother's visit, he read her a book, *The Ghost* (Cowley, 1983), which was one of his first books from the ERI program.

At home throughout the school year, Derek regularly completed his classroom and ERI homework with his parents. He was also exposed to a range of other reading and writing experiences at home (e.g., writing a gift list during Christmas, reading books to his father, teaching his younger brother about first grade). Derek saw reading as being necessary in his father's work so that he could read manuals as he fixed copiers. He was proud to tell me that his mother knew a lot about school and reading; however, when I asked if he liked to read or write, he said no. It might be that within the context in which the question was asked, Derek translated *read* and *write* with *school work*. In his home and community, Derek was literate in a variety of ways considering his use of language and participation in different literacy practices and communities (e.g., being a nature expert, a Cub Scout, a mechanic, and a Lego expert). In the classroom, he was eager to share these literacies, particularly in science, which contributed to his individual learning as well as to the history of his classroom community.

Family Concerns and Involvement

In the beginning of the school year, Derek's mother described Derek to Mrs. Boyd as a smart child with good listening skills, but he did not want to apply his skills to books. She thought he was good in math and mechanics, and he could pick up on instruments when he was listening to music (i.e., he could differentiate between a violin and a viola). Responding to Mrs. Boyd's parent survey, Derek's mother pointed out her perception of Derek's major strengths:

> *Parent Survey, August 1998*
>
> [Derek]...excels at any type of spatial or mechanical learning. He seems to enjoy numbers (math); especially enjoying money! He is fascinated by nature—weather, the animal world, all natural sciences. He loves using any type of tool (except pencils, crayons, etc....). He is highly independent and seems to need to "test" authority before offering his respect. He has been in a school situation for 3 full years (2 preschool - 1 kind.) and believes in the importance of "being a good kid" in school. He is generally happy and loves a good joke. He also is very creative and really enjoys art class.

On the other hand, writing and particularly reading were real concerns for Derek's parents, who regularly worked with him at home and followed Mrs. Boyd's homework calendar and the ERI's program homework activities (both were displayed on their refrigerator).

His family saw learning to read and write at the first-grade level as a difficult challenge for Derek. In the beginning of the school year, one of Derek's parents' teaching goals for Mrs. Boyd was to "help him see himself as a reader/writer" (Parent Survey, August 1998). Aware of the new proficiency standards and the fourth-grade reading guarantee, his mother worried throughout the school year about the possibility of Derek not passing the fourth-grade reading proficiency test.

Early in the school year, Derek's mother was concerned about his low scores in the district's early assessment and his referral to the school's ERI program. She had concerns about how helpful the program would really be for Derek. After being a high school teacher for many years, she worried about the possibility of Derek staying in remedial reading for a long time. She also worried that he would be missing activities he liked such as art and science. After talking with Mrs. Boyd, she decided to sign the permission form for Derek to participate in the ERI program. Mrs. Boyd reinforced to Derek's mother that the program would be helpful and that although the students in the ERI program would miss part of meeting time (e.g., calendar and interactive writing), she tried to rotate their meeting time so that a student would not miss the same thing all the time, and she tried to wait until all students were in the room before reading aloud and giving instructions for morning activities.

In the middle of the school year, Derek's mother felt that he knew he had a lot of work to do on his reading in order to reach the district's proficiency standard. Nonetheless, Derek felt that he could do it, and he was always excited to tell his parents when he was able to read at a higher reading level. Derek's mother felt that he started to make real progress in his reading when he suddenly realized that words are made of letters. She was surprised that he only realized this at that point (in early winter), since he had heard about it so many times at school and at home. Additionally, she felt that having to read the Cub Scout book provided Derek with a different and more personal reason to learn how to read rather than attending to his parents' and teacher's expectations.

Later in the year, Derek's mother commented that Derek's early assessment scores had been affected because he did not feel comfortable about being tested on his first day in school. Although she disagreed with the school's early assessment schedule, she also regretted not having worked with him over the summer to review the content he learned in kindergarten. At the end of the school year, Derek's mother had planned to work with him and her younger son during the summer. She wanted to give Derek a chance to solidify the information learned throughout first grade so that he would have a better start in second grade.

The reading proficiency testing and the possibility of Derek being retained in fourth grade was a critical concern to his mother throughout the school year, and it continued to worry her regardless of his growth and progress at the end of the year.

Audiotape, June 1999

> I'm very concerned, I'll be very honest here, I know that right now he's like, you know, kind of the average or the passing point or just at the passing point or whatever, you know, for his grade. Right on grade level or whatever, I mean. I'd love to see him above grade level…as a reader. (^^^) I'd like to see him just to, I don't know how to say, have a little more of a buffer zone, I guess. So when he gets to something that becomes difficult, or he gets to next year in second grade, you know, I'd like him to start up a little…ahead than where he started this year in first grade, I guess. (^^^)
>
> I guess the part that—this is just a personal thing. The part that really scares me about [Derek] is…that I'm not sure sometimes,…like the standardized testing kind of thing, it's not the kind of learner he is, so I don't have—I'll, I'll be surprised if they, in my opinion, ever give a true assessment of what [Derek] knows and what [Derek] can do because a lot of what [Derek] can do is very…um…is oral and is very spatial

> and physical and those kinds of tests don't test those kinds of things (^^^)....[Derek] is a very nervous child, he bites at his clothes, at his fingernails, ahm, he worries about being good at things and successful at things, I think, you know, ahm...when it comes to a big moment, which is a test, it's a big moment kind of thing. It's not the everyday things. He doesn't worry about the everyday, all the time basis. (^^^) I really worry about that [Derek taking a proficiency test]. That's something that I worry more than anything with him is that [Derek] is gonna get frustrated and simply go with the "I don't know."

The Teacher's Interactions and Relationship with Derek

Mrs. Boyd's instructional goals and decisions in relation to Derek's literacy learning varied over the school year. In the beginning of the school year, she was concerned that if she pushed too hard, Derek would get bogged down and turned off to reading and writing. Her basic goal was to move Derek along by building his confidence as a reader and writer and, at the same time, teaching him the skills that he needed (e.g., word knowledge). In the fall, Mrs. Boyd worked hard at supporting and challenging Derek's writing:

> *Journal Writing, October 1998*
>
> The biggest thing with [Derek] is he is capable of letter-sound relationships when writing. He needs to be nudged along.

In October, Derek's writing had switched from just strings of letters to trying to use some words and sounds. Mrs. Boyd worked individually with Derek on demonstrating and reinforcing how to hear and record sounds in words. Mrs. Boyd felt that working one-on-one on writing and reading was beneficial and ideal for all the students. Unfortunately, due to other curriculum goals and requirements, she was not able to meet with students individually as often as she would have liked.

Mrs. Boyd's interactions with Derek were influenced and expanded by her knowledge of his outside school activities and experiences, as well as his participation in school activities. Her knowledge and consequent understanding of Derek's different identities as a student, child, brother, and Cub Scout provided a broader understanding of him as a learner, which supported and influenced her classroom interactions. For example, in November, when Mrs. Boyd and I visited Derek's home, we were able to observe his skills in putting complicated Lego structures together with the support of pictures in the manual. This home visit provided Mrs. Boyd with a broader picture of Derek as a learner. She was able to see Derek's abilities and skills at building structures, and she learned about the range of his activities and interests outside school. Mrs. Boyd's knowledge of Derek's interests, abilities, and experiences supported the development of a close relationship with him. For example, Derek's mother commented on the importance of the home visit for him. She mentioned that she could see Derek's "self-esteem thermometer" going up as the visit went on, and he felt happy about being able to show his abilities.

Following our home visit to Derek's house, Mrs. Boyd commented that Derek was participating more in the classroom. Despite his playfulness in the classroom, he also took classroom work assignments seriously. In her reflections about the home visits, she wrote

> *E-mail Communication, December 1998*
>
> It [the home visit] does give one so much more insight into a child's background—what they are bringing with them to school, etc. I believe it gives each of the parents the feeling that the teacher is truly interested in their child and them. It gives one the sense that the teacher is a friend…

Over the school year, Derek made significant progress in his reading and writing abilities, as well as his sense of himself as a reader and writer. As previously described, in the middle of the school year, Derek and Mrs. Boyd set reading and writing goals for the rest of the year: to be able to read a chapter book and learn how to better sound out letters in order to be able to spell new words. In March, he graduated from the ERI program. Mrs. Boyd started to meet more often with Derek and other students at his reading level in small reading groups. Her instructional goal was to support Derek's reading progress so that he could keep using and developing his reading strategies to read harder books and meet the district's reading proficiency standard. At the end of the year, Mrs. Boyd was happy with Derek's development of his reading and writing abilities even though he was not able to reach the district's proficiency standard for writing. Mrs. Boyd had concerns about the district's criteria for determining writing proficiency at first-grade level. She had found that students like Derek, who took more risks in their writing but did not spell everything correctly or use lower- and upper-case letters appropriately, got a score lower than or equal to that of a child who wrote simple and repetitive sentences with correct punctuation, spelling, and use of capital letters. Nevertheless, Derek's writing growth was significant in relation to the beginning of the year. More importantly, he developed a better sense of himself as a writer and reader, and he made attempts at writing new words and more elaborate and longer stories.

DISCUSSION: LITERACY LEARNING AS A NEGOTIATED PROCESS

By tracing the literacy learning story of Derek, I examine the interdependence of multiple layers of context influencing and shaping what gets constituted as literacy learning. As a tracer unit, Derek's learning story illuminates the nature of (a) literacy learning as a negotiated process across multiple layers of context, (b) teaching decisions addressing an individual child as negotiating multiple perspectives and expectations, and (c) a definition of literacy as constituted by the negotiation of contexts, perspectives, and expectations.

Derek's learning story involved situated, dynamic, and contradictory definitions of what did or did not count as learning and literacy. Literacy learning for Derek involved a negotiated process of identity construction as a student and literate person. In other words, it involved negotiating personal interests and goals as well as his family's and teacher's expectations and goals, which were situated and constituted within a particular school, district, and state. His parents' and teacher's concerns shaped Derek's identity as a learner. Becoming literate as defined by the district's reading and writing proficiency standards for fourth grade was a major concern for his parents, while supporting Derek's positive image of himself as a reader and writer and reaching the district's proficiency standards were major concerns of his teacher, Mrs. Boyd. At the same time, Derek built spaces at the classroom level (through his relationship with Mrs. Boyd, classmates, and me) to share and build on his outside school experiences and multiple literacies (e.g., his knowledge about science, nature, Cub Scouts). Derek's relationship with Mrs. Boyd—especially her understanding of Derek as a learner—opened up classroom spaces for curriculum co-construction at the individual and collective levels (including one-on-one and whole group interactions). For example, Mrs. Boyd's ability to use Derek's knowledge about penguins and volcanoes during classroom discussions created rich opportunities for Derek to see himself as a competent learner and an expert and to actively contribute to the curriculum being constructed in the classroom. Similarly, when Mrs. Boyd agreed to read a passage from Derek's Cub Scout book as part of shared reading time, she reinforced Derek's choice for extracurricular reading as important and interesting. At the collective level, Derek's new book was used to promote reading and to expand the students' knowledge about reading.

In essence, understanding literacy learning processes requires an understanding of the complex ways in which children construct and use literacies and learning environments in their everyday lives, as well as understanding the complex ways that teachers and children negotiate and make sense of their ongoing process of curriculum co-construction. Classroom literacy learning represents the negotiation and juxtaposition of different texts, and it marks the presence of intertextual links, not only across time and activity within the classroom, but also between classroom events and broader contexts (e.g., the teacher's and students' home and community experiences, the school's and district's history and expectations). It is a process of interpreting and reinterpreting the social world and the learner's place in it (Dyson, 1995). Derek negotiated multiple layers of contexts (and their texts) located within the interactional spaces (Heras, 1993) built at the classroom level and outside the classroom (e.g., his family and community, the school, and the district's proficiency expectations). His identity as a learner and as a reader and writer in the classroom, as well as his teacher's and parents' images of what constituted literacy learning, were situated and co-constructed by the interdependence among multiple contexts.

IMPLICATIONS

The nature of classroom life is dynamic, rich, and complex. By tracing Derek's experiences in the classroom and at home and school over one school year, this study shows that it is necessary to take an over-time look across contexts to understand what becomes constituted as one child's story of literacy learning. Similarly, his teacher's individualized instructional decisions were situated and embedded within multiple layers of context. Derek's literacy learning story displays and illuminates the negotiation and juxtaposition of different texts and contexts that take part in classroom learning. This study demonstrates that the nature of literacy learning is contextually-bound. It needs to be examined in light of the views, beliefs, expectations, educational philosophy, history, and political positions of the teacher, students, their families, school, district, and other social structures in the larger society. Thus, what becomes defined as literacy learning reflects multiple, complex, and situated definitions or perspectives of what counts as literacy and literacy learning and teaching. Literacy learning is an evolving sociocultural and political process shaped by the literacy practices and opportunities for learning and teaching available in the classroom as well as the history and influence of other contexts.

A re-examination of static images of classroom practice and the nature of classroom literacy learning are needed to better understand the nature of literacy learning processes. To understand the nature of classroom literacy learning, as well as to examine appropriate and effective instructional practices, it is important not only to take into account the nature of a particular curriculum and classroom context (i.e., the teacher, students, evolving classroom community, space, time, and materials available) but also the social, political, cultural, and historical contexts in which they are embedded. Despite the rich body of literature in the area of literacy education, controversy continues over what is literacy learning, how best to teach early reading and writing, and how to assess children's learning. More comprehensive insights on the nature and interplay of literacy learning and teaching processes, as well as an examination of the contexts in which they are embedded, can help teachers and other educators understand early literacy in the classroom and the process of curriculum enactment.

AUTHOR NOTE

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Metacognitive Strategy Knowledge: Comparison of Former Reading Recovery Children and Their Current Classmates

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ABSTRACT

The purpose of this study was two-fold: (a) to explore the nature of elementary school children's metacognitive knowledge of strategies appropriate for before, during, and after reading; and (b) to determine whether children who had participated in Reading Recovery instruction in the first grade had similar understandings as their current third- and fourth-grade classmates. Groups that totaled 486 randomly selected former Reading Recovery children and their current third- and fourth-grade classmates were tested using the Metacomprehension Strategy Index (Schmitt, 1988, 1990) to determine their levels of strategy awareness. Comparison of means using analysis of variance was conducted to determine if there were differences in children's levels of declarative strategy knowledge, and an item analysis of the Metacomprehension Strategy Index was generated to illustrate the types of strategies children indicate they use, including the conditional knowledge of knowing when to use them. In addition to results, the efficacy of the Reading Recovery program in helping children reach and maintain cohort-level performance in strategy knowledge is discussed as a means of exploring the timely question of children's subsequent performance.

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Metacognition in literacy learning has received much attention in the literature in the last 15 to 20 years. Writers have noted, however, that metacognition is perhaps not a new construct but rather a new label for the age-old concept of reflective problem solving (e.g., Baker & Brown, 1984; Schmitt, 1986; Smith, 1994). Many suggestions for the implications of metacognitive theory in literacy education have been proffered. For example, Baker and Brown (1984) called for instructional attention to making learners "aware of the active nature of reading, and the importance of employing problem-solving, trouble-shooting routines to enhance understanding" (p. 376). They insist that such awareness is a "prerequisite for self-regulation, the ability to monitor and check one's own cognitive activities while reading" (p. 376), and they refer to the awareness as metacognitive knowledge.

This study explores such knowledge with distinct groups. The purpose was two-fold: (a) to explore the nature of elementary school children's metacognitive knowledge of strategies appropriate for before, during, and after reading; and (b) to determine whether children who had participated in Reading Recovery instruction in the first grade had similar understandings as their current third- and fourth-grade classmates. The latter involves an attempt to investigate how Reading Recovery children compare to their classmates in later years. There are so many intervening variables, it is impossible to attribute their later status to their participation in Reading Recovery in the first grade (Askew, Fountas, Lyons, Pinnell, & Schmitt, 1998); however, it is useful to explore their achievement in a variety of ways, and this study represents a unique way to do so.

LITERATURE REVIEW

Theorists have explained that metacognition refers to both knowledge and control of cognitive processes (e.g., Baker & Brown, 1984; Brown, 1980; Flavell, 1976, 1979). Metacognitive knowledge reflects awareness of the variables of self (e.g., "I know about this topic"), task (e.g., "I know that reading is a left-to-right activity"), and strategy (e.g., "I know that rereading might help me figure this out"). According to the work of Flavell (1976), Garner (1987), Baumann and Schmitt (1986), and Paris, Lipson, and Wixon (1983), metacognitive knowledge can be declarative (knowing that or what about something), procedural (knowing how to proceed), and conditional (knowing when to use a strategy and why it is relevant). Of interest in this paper is the declarative and conditional metacognitive knowledge learners have of appropriate strategies to promote reading comprehension.

Metacognition and Young Readers

Paris, Wasik, and Turner (1991) discuss the notion of learners becoming strategic readers, suggesting that awareness of appropriate strategies for problem-solving in reading is characteristic of older, more proficient learners rather than younger, novice, or less proficient ones; and it seems logical that learners would be developing expertise in this area over time.

Clay's early and more recent writings regarding the cognitive operations of beginning readers, however, include the necessity of their developing "an interlocking network of appropriate strategies which include monitoring and evaluation of consonance or dissonance among messages that ought to agree" (Clay, 1991, p. 329). Consider the strategic processing and the requisite knowledge involved in trying to construct a plausible interpretation of text as described by Clay in *Reading: The Patterning of Complex Behavior* (1979b):

> The competent children resourcefully cast around all their experience to find cues, strategies, and solutions.
>
> At the moment of making an error a child reading for meaning will notice the error; it will become self-evident. This is a monitoring activity. The reader takes some action. At this moment he is observing his own behavior very closely because he will have to decide which response is the best fit, which to retain and which to discard.
>
> As he searches and selects he must carry out two further types of self-regulatory action. He observes his own behavior and he assesses his own behavior. Has he solved it? Has he got it right? Do all the angles of this piece of the jigsaw fit in that particular slot? (pp. 252–253)

It now appears that as young children develop literacy skills, they are already exhibiting signs of emergent metacognitive awareness and control, especially during the individual first-grade intervention called Reading Recovery. For example, Cox, Fang, and Schmitt (1998) provided evidence to suggest that Reading Recovery instruction results in the development of metacognitive awareness and control as its contribution to children's literacy growth. They found that program children exhibited significant and qualitatively distinct growth during the experience not only in their knowledge about self, literacy task, and task-related strategies, but also in their regulatory capacities to gain control over text content and to accommodate audience needs in stories they were dictating for others to read. In addition, Schmitt (2001) analyzed running records of text reading and found that children made significant gains in strategic processing (e.g., self-monitoring, self-correcting, rereading to problem-solve) over the course of their Reading Recovery instructional program (see Clay, 2002 for more information on running records).

Measuring the Development of Metacognitive Knowledge of Reading

Schmitt (1998) used a Metacognitive Interview to study the development of children's metacognitive knowledge during Reading Recovery instruction in comparison to their average-achieving peers. She found that program children generally began the year with lower or roughly equal metacognitive knowledge of reading and writing tasks and strategies in comparison to the average cohort children. However, the Reading Recovery children achieved not only accelerated growth in metacognitive knowledge as predicted, but they also achieved task and strategy knowledge at levels above their counterparts, thereby surpassing them. These results suggest that children learn more than how to perform reading and writing strategies during the intervention; they also develop metacognitive knowledge about tasks and strategies.

While it is true that metacognitive knowledge can only be hypothesized or presupposed by evidence of behaviors that indicate cognitive control (e.g., if readers are observed making a self-correction, one can suppose that they had knowledge of a strategy that allowed for the monitoring and revision processes), it is also possible to question or elicit information from learners regarding their declarative and conditional knowledge of strategies via a variety of self-report measures. In addition to the use of the Metacognitive Interview by Schmitt (1998), Paris and his colleagues developed the Index of Reading Awareness (Paris, Cross, & Lipson, 1984; Paris & Jacobs, 1984), a self-report measure of awareness of the need to evaluate, plan, and regulate reading processes; and Duffy et al. (1987) developed Lesson Interviews and Concept Interviews to assess awareness of strategic processes that were taught in training studies.

The measure used in the current study to explore metacognitive knowledge is the Metacomprehension Strategy Index (MSI; Schmitt, 1988, 1990), a multiple choice questionnaire that was originally developed to measure the strategic awareness of third-grade students who had participated in an experience that promoted the use of metacomprehension strategies (Schmitt, 1988). The MSI will be described further in the procedures section.

The following questions guided the exploration:

1. Which types of strategies (e.g., predicting) and conditional relevance (e.g., before reading versus during reading) appear to be the most commonly known?
2. Are there differences in the types of declarative strategy knowledge and conditional relevance known to children who had and had not successfully completed Reading Recovery in the first grade compared to the cohort group at each current grade level?
3. Are there differences in the levels of strategy knowledge (i.e., numbers of strategies) known to children who had and had not successfully completed Reading Recovery in the first grade compared to the cohort group?

4. Are there differences in level of knowledge between third and fourth graders in these groups such that a developmental pattern of metacognitive knowledge as a construct can be substantiated?

METHOD

Brief Description of Reading Recovery

Reading Recovery is an early literacy short-term intervention for first graders. It involves individual daily tutoring provided by specially trained teachers (Clay, 1993). The goal of this intervention is for children to reach the average level of their peers on measures of text reading, word identification, concepts about print, writing vocabulary knowledge, and phonemic awareness in approximately12–20 weeks. The intervention serves to close the gap between average- and low-progress learners and reduces the numbers of struggling readers in first-grade classrooms and beyond. The instructional goal is that children develop a self-extending system of strategies that allows them to become better readers each time they have the opportunity to read and problem-solve on more challenging text (Clay, 1991).

There are two positive outcomes of Reading Recovery instruction: (a) children reach the average level of their peers and their service is discontinued, or (b) after at least 20 weeks of intensive instruction, a group of educators reviews the information gained relative to the child's strengths and weaknesses and makes a decision regarding a longer-term intervention. In the latter case, the child's program is considered not-discontinued (Askew et al., 1998).

Participants

Children included in this study were randomly selected from the total population of third- and fourth-grade children from 253 schools that had been involved in Reading Recovery for at least 2 years in a mid-sized Midwestern state. To select the sample populations of former Reading Recovery children and a cohort sample group of children who had not received Reading Recovery and represented their classmates, class lists were collected of all children who would be in Grades 3 and 4 in the fall. An interval random sampling technique was used to select 100 children in each group. The groups were designated as follows: third and fourth graders who successfully completed Reading Recovery in the first grade (3RRSD and 4RRSD respectively in the figures and tables accompanying this article); third and fourth graders who had not successfully discontinued from the program (3RRND and 4RRND respectively); and third and fourth graders who had not received the intervention (3CS and 4CS respectively).

The final sample included children who could be located in the fall and for whom parental permission was granted. The composition of the groups is described in Table 1.

Table 1. Participants

	Female		Male		Total	
	n	%	n	%	n	%
3rd grade cohort sample (3CS)	42	50%	42	50%	84	100%
3rd grade successfully discontinued (3RRSD)	53	60%	36	40%	89	100%
3rd grade not discontinued (3RRND)	56	66%	30	34%	86	100%
4th grade cohort sample (4CS)	35	38%	57	62%	92	100%
4th grade successfully discontinued (4RRSD)	60	65%	33	35%	93	100%
4th grade not discontinued (4RRND)	26	62%	16	38%	42	100%

Procedures

To assess both declarative and conditional metacognitive strategy knowledge, Reading Recovery and classroom teachers administered the MSI (Schmitt, 1988, 1990) to the third- and fourth-grade random sample groups of children in the target schools. This measure was the most suitable to answer the research questions posed because it can evaluate types of strategic knowledge, as well as conditional relevance of strategies appropriate for before, during, and after reading. The MSI assesses students' awareness of a variety of metacomprehension behaviors that fit within six broad categories as follows:

1. Predicting and verifying: Predicting the content of a story promotes active comprehension by giving readers a purpose for reading (i.e., to verify predictions). Evaluating predictions and generating new ones as necessary enhances the constructive nature of the reading process.
2. Previewing: Previewing the text facilitates comprehension by activating background knowledge and providing information for making predictions.
3. Purpose setting: Reading with a purpose promotes active, strategic reading.

4. Self-questioning: Generating questions to be answered promotes active comprehension by giving readers a purpose for reading.
5. Drawing from background knowledge: Activating and incorporating information from background knowledge contributes to comprehension by helping readers make inferences and generate predictions.
6. Summarizing and applying fix-up strategies: Summarizing the content at various points in the story serves as a form of comprehension monitoring. Rereading or suspending judgment and reading on when comprehension breaks down represents strategic reading.

The strategies assessed by the MSI are consistent with those taught in several metacomprehension instructional studies (e.g., Braun, Rennie, & Labercane, 1986; Palinscar & Brown, 1984; Paris et al., 1984; Risko & Feldman, 1986).

In addition, the survey is divided by the stage of reading represented by before, during, and after. As such, it reflects conditional knowledge because the child must decide the appropriateness of the strategy relative to the stage.

A sample question that relates to strategy knowledge for each stage follows:

Before I begin reading, it's a good idea to
  A. look at the pictures to see what the story is about.
  B. decide how long it will take me to read the story.
  C. sound out the words I don't know.
  D. check to see if the story is making sense.

While I'm reading, it's a good idea to
  A. read the story very slowly so that I will not miss any important parts.
  B. read the title to see what the story is about.
  C. check to see if the story is making sense by seeing if I can tell what's happened so far.
  D. check to see if the pictures have anything missing.

After I've read a story, it's a good idea to
  A. look up all of the big words in a dictionary.
  B. read the best parts aloud.
  C. think about how the story was like things I already knew about before I started reading.
  D. have someone read the story aloud to me.

For the complete survey, see *A Questionnaire to Measure Children's Awareness of Strategic Reading Processes* (Schmitt, 1990).

There is considerable support for the credibility of the MSI because it has been used extensively in both research and practice. In practical settings, the questionnaire is considered an effective measure of metacomprehension strategies. For example, it has been included in the following nonexhaustive list of textbooks as a suggested and valid means for measuring learners' metacognition or metacomprehension for the purpose of designing instructional programs: *Reading Assessment: Principles and Practices for Elementary Teachers* (Barrentine, 1999), *Literacy Disorders: Holistic Diagnosis and Remediation* (Huber, 1993), *Teaching Reading to High-Risk Learners* (Wood & Algozzine, 1995), and *Psychology in Education Portfolio: Learning Style and Metacognition* (Cameron & Reynolds, 1999).

In the area of research, in addition to the original study, *The Results of an Elaborated Directed Reading Activity on the Metacomprehension Skills of Third Graders* (Schmitt, 1988), the MSI has also been used in *The Development and Validation of a Self-Report Measure of Reading Strategy Use* (Pereira-Laird & Deane, 1997), *Effects of Think-Aloud Instruction on Elementary Students' Ability to Monitor Their Comprehension* (Baumann, Seifert-Kessell, & Jones, 1987), *The Effect of S2RE, a Metacognitive Learning Strategy, on the Reading Comprehension of Elementary Students* (Campbell-Beal, Hall, & Napier, 1993) and *Reading Rescue: Intervention for a Student "At Promise"* (Lee & Neal, 1992–1993).

Reliability and validity data are available for the MSI from a variety of sources. Schmitt (1988) found a statistically significant correlation between the questionnaire and the Index of Reading Awareness ($r = .48$, $p < .001$), the measure devised by Paris et al. (1984) for third-grade students who participated in a metacomprehension training study. In the same study, there were also statistically significant correlations between the MSI and two measures used to assess metacomprehension ability: an error detection task ($r = .50$, $p < .001$) and a cloze task ($r = .49$, $p < .001$). Lonberger (1988) reported an MSI internal consistency value of .87 using the Kuder-Richardson Formula 20, and Pereira-Laird and Deane (1997) reported a Cronbach alpha of .68 for the MSI when used to measure metacomprehension in intervention studies. In the current study, internal consistency values for the MSI resulted from Cronbach alpha coefficients are reported as follows: 3CS = .71, 3RRSD = .71, 3RRND = .47, 4CS = .82, 4RRSD = .72, 4RRND = .59.

ANALYSIS

Statistical analyses comparing means of the various groups were conducted using analysis of variance. An item analysis of the MSI was generated and a Cronbach alpha reliability test was conducted to measure internal consistency (the latter is reported above). The results of these analytic comparisons among groups and across grade levels are presented and discussed in the following sections, including information on levels of strategy knowledge in general and by condition (i.e., before, during, and after reading), and types of strategies.

FINDINGS

Strategy Type: Similarities and Differences

To answer questions regarding the types of strategies (e.g., previewing) known by the children in these groups, an item analysis of the MSI questions was conducted and frequency distributions of the categorical items were compared. To reiterate from an earlier explanation, the categories included "(a) predicting and verifying, (b) previewing, (c) purpose setting, (d) self-questioning, (e) drawing from background knowledge, and (f) summarizing and applying fix-up strategies" (Schmitt, 1990, p. 455).

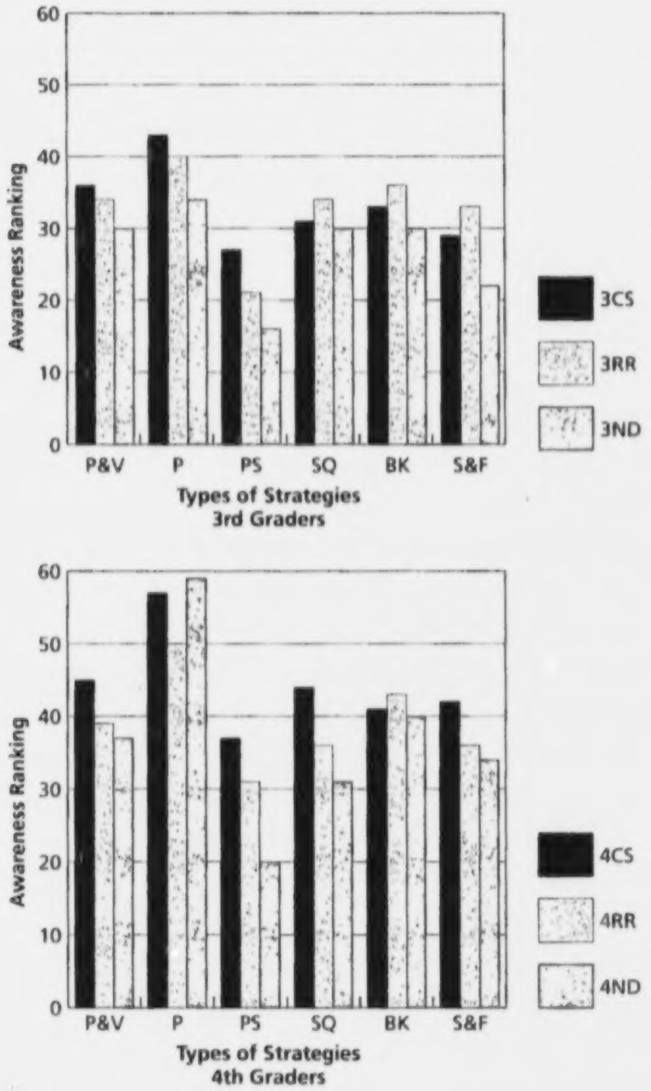
Every time an item from a category was chosen, it was added to the list for that category and frequencies were totaled. The categories were then rank ordered according to the number of times items from it were selected. Specifically, there were six categories of items. Once they were rank ordered, the category that received the most attention by a group received a point value of 6, the category that received the next highest level of attention received a point value of 5, and so on. Table 2 displays means and standard deviations for the

Table 2. Means and Standard Deviations for MSI Strategies by Groups and Grade Levels

	3CS	3RRSD	3RRND	4CS	4RRSD	4RRND
Predicting and Verifying	36 (11)	34 (12)	31 (12)	42 (9)	37 (11)	36 (13)
Previewing	42 (19)	40 (10)	33 (8)	57 (25)	50 (18)	59 (15)
Setting Purposes	27 (14)	21 (17)	16 (14)	36 (20)	31 (14)	19 (11)
Self-Questioning	31 (13)	34 (5)	29 (5)	44 (17)	36 (9)	31 (18)
Drawing from Background Knowledge	33 (12)	36 (15)	29 (9)	40 (10)	43 (9)	40 (14)
Summarizing and Applying Fix-Up Strategies	29 (14)	33 (18)	22 (10)	42 (20)	36 (16)	34 (17)

Note: CS = Cohort sample children; RRSD = Former Reading Recovery children who were successfully discontinued; RRND = Former Reading Recovery children who were not successfully discontinued; MSI = Metacomprehension Strategy Index (Schmitt, 1988, 1990).

Figure 1. Third and Fourth Graders' Awareness of Strategy Types



Note: P&V = Predicting and verifying; P = Previewing; PS = Purpose setting; SQ = Self-questioning; BK = Drawing on background knowledge; S&F = Summarizing and using fix-up strategies. CS = Cohort sample children; RR = Former Reading Recovery children who were successfully discontinued; ND = Former Reading Recovery children who were not successfully discontinued.

category selections and Figure 1 graphically displays the distributions by category and grade level.

From the distributions of strategy types (Figure 1), it can be noted that previewing is a strategy about which all groups of children across the two grade levels had knowledge (e.g., "Before I begin reading it's a good idea to look at the pictures to see what the story is about").

Second, the strategy of making predictions and reading to verify them seemed important to all children as a way to promote comprehension (e.g., "While I'm reading, it's a good idea to keep thinking about the title and the pictures to help me decide what is going to happen next"). Drawing from background knowledge was the next strategy recognized, although it was given less notice by the cohort sample group of fourth graders (e.g., "Before I begin reading, it's a good idea to think of what I already know about the things I see in the pictures"). Summarizing and applying fix-up strategies seemed to increase in importance for all groups in the fourth grade (e.g., "While I'm reading, it's a good idea to reread some parts or read ahead to see if I can figure out what is happening if things aren't making sense"). It is clear that setting purposes for reading is not a strategy recognized as salient for any of these children, perhaps being one that will develop later.

Qualitatively there are other interesting characteristics of the questions' alternative responses. For example, 15 of the questions have distracter responses that could be considered item oriented or perhaps less effective comprehension strategies. "Look up all of the big words in the dictionary" or "check to see if most of the words have long or short vowels in them" as pre-reading strategies are not as effective as "read the title to see what the story is about." There are also 11 distracter items that reflect effective strategies but ones that are appropriate for a different stage of reading (e.g., before reading rather than while reading). These questions provide information regarding the conditional knowledge (i.e., knowing when and why) that Paris and his colleagues (1983) discuss. A one-way ANOVA was conducted to see if there were differences among groups at each grade level relative to these items. No significant differences were found, suggesting that the groups were similar in their levels of understanding about effective strategies and their conditional use.

However, despite the lack of significant differences in these categories as a whole, there were a few questions that revealed differences between the children who had successfully completed Reading Recovery and the cohort sample group with respect to knowledge about less effective or item-oriented strategies. For example, in response to the question "Before I begin reading, it's a good idea to," 21% of the fourth-grade cohort sample responded that they would "make a list of words I'm not sure about," compared to 11% of the Reading Recovery children who said they would "use the title and the pictures to help me make guesses about what will happen in the story." In the same manner, when asked

"After I've read a story, it's a good idea to," 23% of the cohort sample children said they would "look up all of the big words in the dictionary," while only 11% of the former Reading Recovery children who had or had not been discontinued responded similarly with a less effective strategy.

And with respect to strategies that are appropriate for a different stage of reading demonstrating conditional knowledge, 31% of the third-grade cohort sample group indicated they would "check to see if I am understanding the story so far" as a pre-reading strategy, while only 18% of the third-grade Reading Recovery successfully discontinued group did so. And 35% of the fourth-grade cohort sample group responded they would "reread some parts to see if I can figure out what is happening if things aren't making sense," relative to 21% of the fourth-grade Reading Recovery successfully discontinued group.

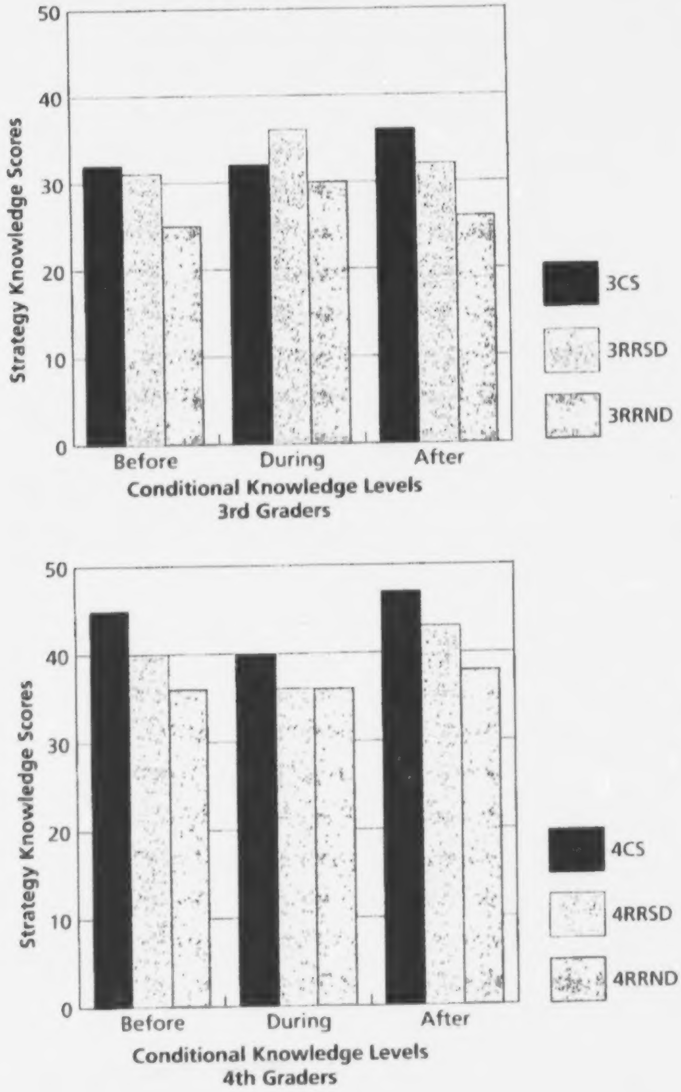
Conditional Knowledge: Similarities and Differences

To explore children's levels of conditional knowledge, group mean scores for items representing before-, during-, and after-reading strategies were compared by ANOVA. Figure 2 reflects these distributions that include the following means and standard deviations: before-reading strategies: third-grade cohort sample = 32.3 (13.6), third-grade Reading Recovery successfully discontinued = 31 (14.7), third-grade Reading Recovery not-discontinued = 25.3 (11), fourth-grade cohort sample = 44.7 (16), fourth-grade Reading Recovery successfully discontinued = 39.7 (12.2), and fourth-grade Reading Recovery not-discontinued = 36 (17.8); during-reading strategies: third-grade cohort sample = 32.4 (12.3), third-grade Reading Recovery successfully discontinued = 35.5 (13.9), third-grade Reading Recovery not-discontinued = 30.4 (9.9), fourth-grade cohort sample = 40.3 (15.2), fourth-grade Reading Recovery successfully discontinued = 36.1 (12.5), and fourth-grade Reading Recovery not-discontinued = 35.8 (15); after-reading strategies: third-grade cohort sample = 35.8 (12.4), third-grade Reading Recovery successfully discontinued = 32.4 (12.9), third-grade Reading Recovery not-discontinued = 26 (12.6), fourth-grade cohort sample = 46.8 (11.9), fourth-grade Reading Recovery successfully discontinued = 43.2 (11), and fourth-grade Reading Recovery not-discontinued = 38 (18).

The ANOVA indicated there were no significant differences between the groups of children either at each grade level or within groups when conditional knowledge was analyzed. Specifically, the data indicated that (a) cohort sample third- and fourth-grade children were equally as knowledgeable about strategies for before reading as for during or after reading, and former Reading Recovery children displayed the same patterns; and (b) former Reading Recovery children were equally as knowledgeable about strategies for before, during, and after reading as their counterparts in third and fourth grades.

The fact that all of the groups of children were consistent in their strategy

Figure 2. Third and Fourth Graders' Conditional Knowledge Levels



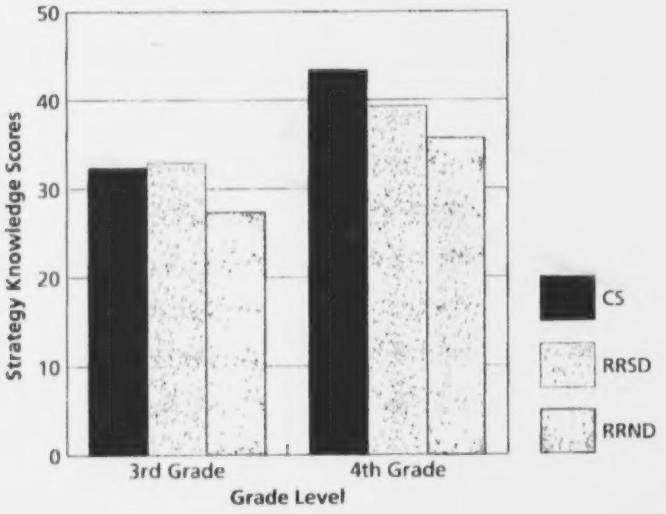
Note: CS = Cohort sample children; RRSD = Former Reading Recovery children who were successfully discontinued; RRND = Former Reading Recovery children who were not successfully discontinued.

knowledge by condition (i.e., before, during, and after reading) both within groups and across groups, suggests that children are developing more global metacognitive knowledge. That is, rather than learning strategies for during reading only, the children are developing knowledge about appropriate strategies throughout the process of reading narratives.

Declarative Knowledge Level: Similarities and Differences

To answer the question whether or not there were differences in the recognized levels of declarative strategy knowledge among the groups (cohort sample, Reading Recovery successfully discontinued, and Reading Recovery not-discontinued) at each grade level, mean scores from the MSI were compared and analyzed by ANOVAs for each grade level separately. Figure 3 is a graphic representation of the frequencies that include the following means and standard deviations: third-grade cohort sample = 32.4 (16.6), third-grade Reading Recovery successfully discontinued = 32.9 (16.1), third-grade Reading Recovery not-discontinued = 27.4 (11.6), fourth-grade cohort sample = 43.4 (20.6),

Figure 3. Group Declarative Strategy Knowledge by Grade Level



Note: CS = Cohort sample children; RRSD = Former Reading Recovery children who were successfully discontinued; RRND = Former Reading Recovery children who were not successfully discontinued.

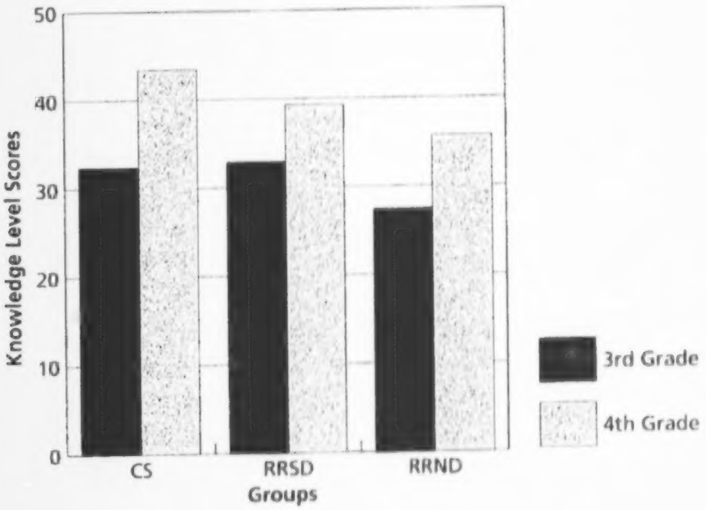
fourth-grade Reading Recovery successfully discontinued = 39.3 (17.2), and fourth-grade Reading Recovery not-discontinued = 35.7 (14.2).

The statistical comparisons of means indicated that all children who had participated in Reading Recovery in the first grade (third-grade Reading Recovery successfully discontinued, third-grade Reading Recovery not-discontinued, fourth-grade Reading Recovery successfully discontinued, and fourth-grade Reading Recovery not-discontinued) are as knowledgeable about reading strategies as their classmates (third-grade cohort sample and fourth-grade cohort sample) 2 and 3 years after the intervention. Specifically, the ANOVA and post hoc analyses indicated there were no significant differences between these two groups of children in either the third grade or the fourth grade.

Developmental Nature of Metacognitive Knowledge

Displayed in Figure 4, fourth-grade groups achieved significantly higher levels of strategy knowledge than third graders in each of the groups ($F(5,375) = 6.89$, $p < .000$). This significant growth in declarative strategy knowledge

Figure 4. Growth in Declarative Strategy Knowledge by Group and Grade Level



Note: CS = Cohort sample children; RRSD = Former Reading Recovery children who were successfully discontinued; RRND = Former Reading Recovery children who were not successfully discontinued.

between third and fourth grade suggests that the development of metacognitive knowledge may be a developmental characteristic. Such growth is consistent with Paris and Jacobs' (1984) findings regarding differences between early elementary age groups' reading strategy awareness, noting increases in age cohorts. This information also substantiates that the MSI is measuring a developmental construct.

DISCUSSION

The declarative and conditional strategy knowledge demonstrated by the groups and across grade levels allows for possible interpretations relative to learning and instruction for the various groups of children. The comparisons that can be generated are telling and prove insightful. For example, the children who participated in Reading Recovery in the first grade appear to be on equal footing with their classmates in Grades 3 and 4. If one considers that these former Reading Recovery participants were among the lowest-achieving children in their cohorts at the outset of their primary schooling (see Askew et al., 2002 for evidence of entry levels), it is perhaps the case that a strong early intervention that focused on and resulted in increased strategic processing (e.g., Schmitt, 2001), strategy awareness (Schmitt, 1998), and sound subsequent classroom instruction contributed to their development and maintenance of metacognitive strategy knowledge.

Such a conclusion is only tentative and exploratory at best because the rules for establishing causation cannot be met in this particular case. It would not have been possible to test children as first graders using the MSI to provide for entry-level knowledge of strategy awareness. However, explorations such as this respond to the now timely and important call by Shanahan and Barr (1995) to demonstrate that early interventions are worth the effort and investment because of long-term maintenance of gains made. It has been shown that first-grade achievement predicts with alarming accuracy (Allington & Walmsley, 1995) later placement in schooling. For example, Juel (1998) found that a child who was a poor reader in Grade 1 had a high probability of being a poor reader in Grade 4, while average readers remained in that status over time.

While numerous studies have demonstrated that former Reading Recovery children compare favorably with their average-achieving peers on standardized reading tests in higher grade levels (e.g., Askew et al., 2002; Brown, Denton, Kelly, & Neal, 1999; Rowe, 1995; Schmitt & Gregory, 2001), this study presents a picture in time of how former Reading Recovery children compare to their peers on reading strategy awareness (i.e., metacomprehension) and adds to the body of knowledge regarding subsequent performance of children benefiting from early intervention in literacy.

IMPLICATIONS

The educational implications of these findings relate to instruction that fosters strategic reading and the assessment of metacognitive knowledge. As Paris et al. (1991) explain,

> Strategic reading is a prime characteristic of expert readers because it is woven into the fabric of children's cognitive development and is necessary for success in school. There are six crucial reasons why strategic reading is fundamental to the development and education of children. First, strategies allow readers to elaborate, organize, and evaluate information derived from text. Second, the acquisition of reading strategies coincides and overlaps with the development during childhood of multiple cognitive strategies to enhance attentions, memory, communication and learning. Third, strategies are controllable by readers; they are personal cognitive tools that can be used selectively and flexibly. Fourth, strategic reading reflects metacognition and motivation because readers need to have both the knowledge and disposition to use strategies. Fifth, strategies that foster reading and thinking can be taught directly by teachers. And sixth, strategic reading can enhance learning throughout the curriculum. (p. 609)

An overarching thread that transverses the various ways this paper analyzes metacognitive knowledge relates to Clay's (1991) notion that children need to develop a self-extending system of literacy strategies that allows them to increase their strategic processing capabilities each time they read. Clay suggests that "this act of reading expands the range and effectiveness of strategies which the reader can bring to the task, and the size of the practiced response repertoire upon which he can draw" (p. 317). Moreover she notes, "The acquisition of appropriate strategies could explain how such a system extends itself" (p. 331).

Clay (1991) suggests that teachers can design instruction that facilitates children's attempts to build a self-extending system of strategies by attending to the cognitive operations the child initiates and carries out rather than attending to the items of knowledge a child has. "The teacher is more concerned to reinforce how the child worked to get the response than whether the child arrived at the precise correct response. In this way, the teacher is responding to the learner's construction of strategic control over reading and writing processes" (p. 343).

In conclusion, this study provides information regarding the strategies that early elementary children can recognize as valuable and suggests that awareness of strategies is developmental. Interestingly, the results indicate that children who participated in Reading Recovery in the first grade are on equal footing with their peers in third and fourth grades in terms of their levels of strategy knowledge, the types most commonly reported, and their understanding of when to perform them.

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Envisioning Story: The Eye Movements of Beginning Readers

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ABSTRACT

Miscue analysis and eye movement analysis are used to explore the reading process of first-grade beginning readers as they use pictures and print in a picture book designed for instructional purposes. Eye movement miscue analysis (EMMA) is also used as a tool to gain insights into the reading strategies of the beginning readers in this study. Miscue analysis provides a psycholinguistic analysis of unexpected oral responses in the oral text that readers produce. Eye movement analysis provides an analysis of the visual fixations of readers in the pictures and the print. Both forms of analysis are used to examine the relationship between the oral and visual aspects of the reading process.

This article focuses on first-grade beginning readers' use of pictures and print as they read. Patterns of eye movements relative to picture use, print use, and the relationships between the two media are described, analyzed, and compared.

Major findings include that beginning readers are aware that reading is a complex process of making meaning from print and pictures; they exhibit many of the same reading strategies as older, more experienced readers; and they sample pictures in ways that are purposeful and know where to look for useful information.

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It is the first day of the school year and Luke, a first-grader, is reading a Sunshine Series book by Cutting and Cutting entitled *Are You a Ladybug?* (1988). Before Luke begins, he tells me that he really doesn't know how to read because he doesn't know all the words. With encouragement, he agrees to try. He encounters several challenges and handles them in various ways. Sometimes he pauses, looks at the pictures, goes back to the print, and sounds out the first letter of the next word. Other times, he goes back and seems to be studying the picture. For each difficult word that he encounters, Luke eventually makes an attempt. Often his attempt matches multiple sources of information including the graphophonic information that he has accessed, his current syntactic understandings, his semantic knowledge, his understandings of the picture, and his background knowledge and life experience about story and picture books.

Luke's various attempts to solve difficult words offer a view into his reading process, demonstrating how readers draw upon various sources of information in order to make a reading attempt. Many assessment tools are available to measure how students use all of these sources of information with the exception of pictures. The lack of available evidence about children's use of pictures to read is somewhat surprising, given that children who are emerging into literacy appear to make extensive use of the information provided in illustrations to help them read. In fact, Adams (1990) noted that there is virtually no available information on how beginning readers constructively use pictures to read.

Authors and illustrators of children's literature intentionally create pictures and texts that achieve a wedding of two sign systems: words and illustrations. According to Kiefer (1995), Barbara Cooney, a well-known Caldecott award winner,

> likened the picture book to a string of pearls. She suggested that the pearls represent the illustrations, and the string represents the printed text. The string is an object of beauty on its own, but the necklace cannot exist without the string. Although in picture books a verbal text should certainly be beautiful and bring pleasure in and of itself, Cooney's analogy supports the idea of the interdependence of pictures and text in the unique art object that is a picture book. (p. 6)

Together the subtle weave of words and pictures allow both to tell one seamless tale (Scieszka, 1998). We also know that children are aware of this weaving of pictures and print into one story by their own writing and conversations about pictures and print (Hubbard, 1989; Yaden, Smolkin, & Conlon, 1989).

In this paper, I report the findings of a study that examines whether and how children use pictures in their reading attempts. In addition to collecting data on students' oral reading behaviors, I also collected data on their eye movements while reading aloud. Combined, these two data sources provide a deeper understanding of what children are noticing and using while they read. Not only does such a study take us beyond surface observations of oral reading behaviors, it also provides a deeper understanding of the reading process in terms of what children are noticing and using as they read.

LITERATURE REVIEW

Most research regarding print and pictures in early reading falls into two categories: (a) word identification and pictures and (b) comprehension and pictures. Studies involving word identification and pictures generally focus on finding out whether or not pictures are beneficial in the teaching of sight words (Samuels, 1977; Singer, 1980; Willows, 1978a; Willows, 1978b). The second set of studies involves older proficient readers reading complete illustrated texts to determine the effects of pictures on comprehension. Vernon's studies (1953, 1958) typify such research in that the focus is one of determining the effects of the treatment of including pictures in a text on reading comprehension (Holmes, 1987; Koenke, 1968, 1980; Koenke & Otto, 1969; Weintraub, 1960, 1966).

Denburg's (1976) study falls outside these two broad categories in that she examines first-grade readers' use of pictures in reading complete texts. Her study suggests that pictures have a positive influence on reading (when defined as word identification) and that beginning readers do use pictures and print together when reading; however, the study does not provide detailed information about how beginning readers use both pictures and print as they read.

During the early 1920s, Buswell (1922) conducted eye movement studies involving first-grade beginning readers. His study explored readers' eye movements relative to the texts, two methods of instruction (word analysis focused and meaning focused), and differing pathways toward a mature reading attitude. He found that while readers exhibited different eye movements related to the method of instruction experienced, these eye movements were not significant (better or worse) if considered in relation to the ultimate goal of mature reading habits.

This study extends the body of research on eye movements and reading by examining the data provided when participants read aloud. I used miscue analysis (Goodman, 1967) to collect and analyze the oral readings of participants in my study. Miscue analysis provides a window on the reading process and the knowledge and strategies that readers employ as they read.

METHOD

Participants

Data were collected from 10 first-grade beginning readers with data from six readers ultimately proving usable. Cory, Esmeralda, Javier, Kimberly, Mac, and Rashaun attended both public and private schools. Esmeralda and Mac were Spanish-English bilingual and biliterate. The six readers represented three ethnic ancestries—Hispanic American, African-American, and European-American—as well as diverse socioeconomic groups.

Data Collection

I intentionally used a text designed for instructional use in schools that a first-grade beginning reader might be able to read without support but one which would elicit some miscues in the reading. After experimenting with several texts, I selected *I Saw a Dinosaur,* a Literacy 2000 Stage 2 Set D book published by Rigby, written by Joy Cowley (1988), and illustrated by Phillip Webb.

I collected three sets of data for each reader. The primary set was in the form of the oral reading with the eye movement data. There were two secondary sets of data: a modified Burke Reading Interview and retellings, which were used to uncover readers' conceptualizations of reading and to confirm their comprehension of the stories that they read. The retellings are a standard component in any miscue analysis. The data were collected using an ASL model 5000 eye-tracking machine, a computer to record oral data, and an audiocassette recorder to collect back-up and additional oral data.

Analyses

Paulson (2000) used eye movement research in conjunction with miscue analysis to create a hybrid form of analysis that he has called EMMA (eye movement miscue analysis). EMMA uses both miscue analysis and eye movement to examine the relationship between eye movements and miscues that readers produce as they read in order to reveal the complex relationships between where the eye has been directed by the brain and what the voice is producing as an oral text.

I performed three levels of analysis: miscue analysis of the reading, eye movement analysis of the reading, and EMMA of the reading. A total of 1,308 eye fixations on print were analyzed. Again, eye movement and EMMA are the focus of this article.

Findings

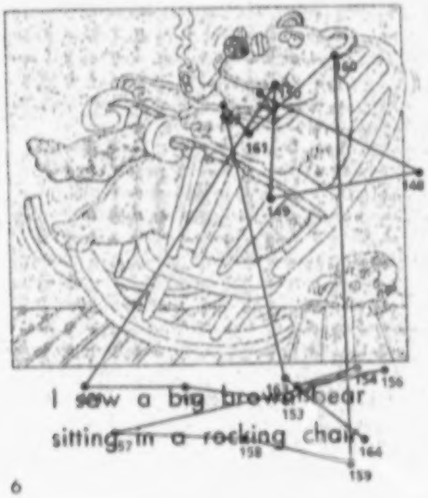
First-grade beginning readers in this study fixated (or looked at) print, pictures, and other areas as they read the complete text. They fixated print more frequently than pictures. On average, 55% of the fixations were in print and 36% of the fixations were in pictures. The remaining 9% of fixations were in other areas outside the print and picture fields.

In terms of fixation duration (time spent fixating) of these three areas, the readers devoted 73% of their time viewing print, 21% of their time on pictures, and 6% on other areas outside the print and picture fields. All readers had average fixation durations in print that were greater than their overall average fixation durations of the three categories combined (print, pictures, and other). Rayner has replicated this finding in a recent print-picture study with adult readers viewing magazine advertisements, in which he reports that subjects spent 67%, 73%, 72%, and 77% of their time reading the text (Rayner, personal communication, 2001).

All readers had average fixation durations in pictures that were less than their average fixation durations of the three categories combined (print, pictures, and other). All readers had average fixation durations in print that were almost double their average fixation durations in pictures.

None of the readers fixated every word in the text; readers' nonfixation rate varied from 9% to 34% of the words in the text. Figure 1 illustrates where Rashaun fixated and did not fixate as he read page 6. The lines between the

Figure 1. Eye Movements Showing Fixations and Saccades



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dots represent saccades, (eye movements between fixations) during which no useful graphic information is transmitted to the brain. Previous eye movement research has substantiated the occurrence of nonfixations during reading (Just & Carpenter, 1987; Paulson, 2000; Rayner, 1997).

Like Paulson's (2000) readers, the first-grade readers in this study did not always fixate words serially from word to word, left to right. As they read, readers engaged in regressive eye movements within print or transitioned from print to pictures and then back to print. They also engaged in fixations that shifted vertically from line to line and diagonally across the print field. Readers did not always fixate words for the same amount of time. They did not always fixate at the center of words, horizontally or vertically. There was a low incidence of fixations that fell between lines of print, between words, and in the blank margins of the page.

All readers spent less than 1.5 seconds in fixating pictures prior to entering print. For monolingual speakers, this amount of picture-viewing time prior to entering print was even further reduced to less than .5 second.

Bilingual readers in this study fixated pictures and print more frequently and for longer periods of time than their monolingual counterparts. Bilingual readers' average fixation times were longer than those of monolingual readers. These findings regarding bilingual readers are not new eye movement research. Cattell (1886) found that second-language readers took more time to read texts. Almost a century later, Oller and Tullius (1973) further substantiated this finding. Although bilingual readers fixated pictures and print more frequently and for longer periods of time, their fixation durations were proportionally similar (in terms of percentages) to monolingual readers.

Among all readers, 20% transitioned from pictures back to print by moving to a word prior, 45% by moving to the same word, 26% by moving to a word beyond, and 9% by moving to other areas outside word boundaries.

On average, regressive eye movements (eye movements which move backwards in the text) accounted for 14% of all eye movements. Regressions within sentences (moving backward across word boundaries within a sentence) accounted for 52% of all regressive eye movements, while regressions within words (moving backward within word boundaries) accounted for 46% of all regressive eye movements.

As Table 1 illustrates, in instances of words with multiple occurrences, readers fixated the same word (in this example, the word *a*) in different contexts for different durations (amounts of time). In some contexts they did not fixate the word at all.

When sampling pictures, readers devoted a majority of their time (fixation duration: 90%) and fixations (number of fixations: 89%) sampling major components such as characters and objects within the pictures.

The first-grade beginning readers in this study were more likely to not fix-

Table 1. Total Fixation Durations (in Seconds) on the Word *A* in Multiple Contexts

Word	Page	Cory	Esmeralda	Javier	Kimberly	Mac	Rashaun	Average
a	2	0.85	1.16	0	0	1.07	0	0.51
a	3	0	0.53	8.99	0.71	0.94	0	1.86
a	5	1.33	0.31	0	0	1.36	0	0.50
a1	6	0	2.59	0	0.52	0.58	0	0.61
a2	6	0.46	0	0	0.95	0.9	0	0.38
a	7	0.56	1.56	0	0.73	0	0	0.55
a	8	0.48	4.31	2.33	1.57	1.93	0.18	1.52
Total Duration		3.68	10.46	11.32	4.48	6.78	.18	6.02
Average		.52	1.49	1.61	.64	.95	.02	.86

ate function words than content words. On average for all readers, 82% of non-fixated words were function words. This is a common finding within eye movement research. Paulson (2000) found that his readers fixated 79% of the content words and just 46% of the function words. Just and Carpenter (1984) found that 74% of content words were fixated, while only 40% of function words were fixated.

Readers were also more likely to transition from print to pictures at content words. On average, 91% of all transitions from print to pictures were from content words.

EMMA analyses involved examining readers' oral miscues relative to eye fixations within the eye-voice span across the reading of the complete text. Eye-voice span refers to the phenomenon that readers' eye fixations are generally ahead of their voice as they read.. EMMA analyses revealed that first-grade beginning readers in this study engaged in picture sampling prior to producing a miscue 86% of the time. Readers sampled from pictures prior to omissions 91% of the time. All readers fixated miscued words well beyond their personal average fixation duration prior to miscue production 94% of the time. Paulson (2000) reports similar findings. In cases where miscues were corrected, post-miscue fixations on the same word occurred 100% of the time. Readers also engaged in regressive eye movements, transitioned to pictures, or both, 100% of the time when miscues were corrected.

In cases where readers produced oral repetitions, regressive eye movements or picture sampling, or both, preceded the oral repetition. During oral pauses, readers engaged in fixations of extended durations or multiple fixations. In most cases, these extended fixations or multiple fixations included picture sampling. During oral pauses, all readers were active in terms of eye movement, indicating equal brain activity. The data analyses related to oral pauses and eye movements show clearly that although readers' voices may be inactive, their eyes are not. Since eye movement is brain-directed, this can only mean that both readers' eyes and brains are active during oral pauses. When teachers interrupt readers during oral pauses, they interrupt readers' thought processes toward independently making sense of the information that they are sampling from print and pictures as they read.

Discussion

The readers in this study apparently sampled both pictures and print in ways that were strategic and systematic in order to orally construct a text that made sense. They demonstrated awareness of the systematic nature of their actions. They used pictures and print in ways to construct meaning that transmediated (Leland & Harste, 1994) both media.

The readers employed a variety of reading strategies for making sense of the text as they read. They used their knowledge of oral language, their knowledge of written language, information from the printed text, and information from the personal text that they were constructing as they read.

As they read, the readers made decisions about where useful information would be located. These decisions were based on information that the text offered and on the evolving text that the reader was constructing.

In relation to picture and print use, readers spent more time sampling print than pictures; however, this is not to imply that the pictures were without value. Readers sampled from pictures in ways that appeared to be purposeful and systematic. Their sampling of pictures relative to print suggests that they were well aware of the relationships between pictures and print and how to effectively access those relationships. In sampling pictures and print, they devoted the majority of their time to the major meaning carriers in both media. In pictures, they sampled from the major components (characters and objects) which were key sources for information regarding who and what were central to the story as well as the actions between characters and objects. Thus, the sampling of major components in pictures provided the reader with information regarding nouns, adjectives, and verbs. Within print, readers knew enough to sample more frequently from content words (nouns, adjective, adverbs, and verbs) because these words are the major meaning carriers in print. Readers' systematic transitioning from content words to major components in pictures indicated that they were well aware of the fact that content words in print and major components in pictures are related in terms of informational value.

Readers were less likely to fixate function words. As readers progressed throughout the text, they learned more about how the text was constructed. As a result, they were able to make more informed predictions about what was coming next and where valuable information would be located in the print. They arrived at places in the text where constraints of the text and their knowledge of English were so strong that they were able to confidently predict function words, making it unnecessary to fixate those words in order to produce them orally.

The sampling of pictures and print played key roles in correction strategies. Readers regressed and refixated the miscued word and generally resampled the picture. Their knowledge of the relationship between content words and major components in pictures proved informative in the correction process. They seemed to know where they would find useful information in order to confirm or disconfirm the text that they were producing and where to get cues to textual constraints in building meaning.

Reading is a constructive process. The first-grade beginning readers in this study used the same reading processes as adult readers, but perhaps because they were less experienced, the readers in this study sampled the pictures and print more frequently than older, more experienced readers.

Implications

Educators need to be aware that pictures do not constitute a distraction in the reading of picture books. Practices such as covering the illustrations to force readers to focus on print only create a further fracturing of the reading experience and makes reading more difficult.

The fact that readers in this study (and proficient adult readers) do not fixate every word as they read implies that reading is not a word-by-word identification process. If instruction focuses on having readers fixate every word in print, the reading process will be influenced in ways that run contrary to what proficient readers do when reading. Instructional practices that demand that readers look at every word (or every letter) will slow down the reading process, making comprehension more difficult.

Educators need to realize that when readers miscue, it is not because they have not thoroughly examined the word on which the miscue occurs. The data from this study and Paulson (2000) show that miscues occur only after readers have thoroughly examined the text and rejected what it offers because it does not fit with the syntactic, semantic, or pragmatic knowledge that the reader brings to the text.

Proficient readers are sometimes characterized by their ability to identify words in any context in an equal amount of time. By this definition, good readers are accurate automatic word identifiers; however, the data from this study strongly refute this idea. Instead, the data show that readers make contextually influenced adjustments to the time devoted to viewing words based on the printed text and the oral text that they are producing as they read. There are instances in which the reader's oral text and the printed text conjoin and the reader predicts words without ever fixating them. Likewise, there are instances in which the reader's oral text and the printed text strongly diverge. The data in this study show that at such points, readers exhaustively examined the print and picture resources offered and consciously rejected what does not make sense or fit with the oral text that they were producing. In both cases, the contextual and textual constraints conjoined to support the dynamic emergence of text.

EMMA analyses found that the readers in this study exhibited the phenomenon of eye-voice span that has been historically reported in eye movement research. The concept of eye-voice span calls into question instructional practices that ask readers to match oral text to print. If flexible eye-voice span is the mark of proficient readers, then is it effective to ask readers to match voice to print? If so, under what conditions is this practice effective, for what purposes, and for how long? Additionally, teachers need to realize that the concept of eye-voice span challenges the idea that when readers' voices are producing an oral text, the point of oral production and the location of the eye in collecting information are not synonymous.

The data from this study also indicate that when readers pause in oral reading, they are sampling picture and print resources to make sense of the text. Traditionally, educators have been encouraged to consider oral pauses as a sign of readers' inactivity and a plea for help. However, the data from this study suggests this may not be the case. Instead of interrupting readers' thought processes during oral pauses, educators might wait to see what readers decide to do or to acknowledge that readers are working and then ask them what they want to do. An oral pause is a strategic learning opportunity in which readers integrate information from the three cuing systems in order to make sense of pictures and print. These are the moments at which readers make decisions regarding strategies that they can employ to make meaning. If educators interrupt to tell them the word, they may be taking away an important strategic learning opportunity.

The data in this study support a transactive socio-psycholinguistic model of reading (Goodman, 1996) because the model accounts for and explains reasons for readers' performances in this study including nonfixated words, words with multiple occurrences with varied fixation times ranging from zero to 8.99 seconds, textual influences on readers' production of miscues in one context and not another on words with multiple occurrences, regressions across large linguistic units, and readers' extended fixation times on words prior to miscue production.

Limitations

The study is limited in terms of the number of informants involved; however, it serves as a baseline study to which subsequent reading research may add.

The length of the text (55 running words) is an issue because miscue analysis generally works with texts that are longer than 250 words in length. Research (Menosky, 1987) has shown that the quality of miscues changes substantially after the first 250 words; however, I intentionally chose a short text because I wanted to achieve a match with the kind of text commonly used in the classroom. While this text is generally used for instruction, it does not come from basals, which are more frequently used in classrooms than the kind of material that *I Saw a Dinosaur* represents. A contrastive study, therefore, involving trade books and instructional texts might prove informative and beneficial.

The study is also limited by the small number of miscues produced by readers in this study. Miscue analysis researchers generally agree that at least 25 miscues are needed in order to be able to gain insight into the reader's miscue patterns and reading strategies. Across all readers in this study, a total of 53 miscues were analyzed, and a total of 2,347 eye fixations were examined and analyzed. Although there were 55 running words in the text, not all words were fixated with equal frequency. At times words were not fixated at all; at other times, words were multiply fixated, resulting in more than one fixation per word.

Finally, analyses within this study involved the use of traditional eye movement research in which eye fixations were ascribed to words and within word boundaries. Technically speaking, eye fixations do not always fall neatly within word boundaries. At times the graphic information that falls within the foveal field (the area of greatest visual acuity) falls across word boundaries or across boundaries of lines of print. Therefore, the traditional use of word boundaries in ascribing the location of fixations is an additional limitation of this study. The phenomenon of ascribing fixations to words and ignoring beyond word boundary or multiple word boundary fixations has not been challenged within eye movement research. The idea of arbitrarily forcing eye movements to fit within word boundaries distorts the data—to what degree, eye movement researchers will not know until we begin to examine and compare fixations based on foveal boundaries and fixations arbitrarily ascribed at word boundaries.

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Phonemic Awareness: Clarifying What We Know

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ABSTRACT

In this article, Marilyn Chapman provides educators and others interested in early literacy with important information about phonemic awareness to help them make decisions about what to do in their schools. She begins with an explanation of phonemic awareness and how it relates to other aspects of literacy development such as phonological awareness and metalinguistic awareness (concepts of print). Next she explains key findings from research in order to address some of the most frequent claims about phonemic awareness and clarify what the research actually shows about phonemic awareness. She also describes a research-based developmental sequence to help educators determine age-appropriate expectations about phonemic awareness and related concepts and suggests strategies for assessment. This is followed by a discussion of classroom-based strategies for fostering children's phonemic awareness and related phonological skills through meaning-centered classroom activities that help children connect these skills to real reading and writing, particularly the importance of language play and the use of invented spelling. Finally, she provides suggestions for intervention for children who need additional support.

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Interest in phonemic awareness continues to spread throughout North America. In the United States, an increasing number of states are mandating phonemic awareness training in kindergarten and first grade, and in Canada more and more school districts are importing American phonologically based reading programs such as Open Court and Reading Mastery to provide phonemic awareness training to kindergarten and first-grade students. The growing interest in phonemic awareness is not that surprising, given that recent International Reading Association surveys show that its members consider phonemic awareness to be a hot topic which "should not be hot" (Cassidy & Cassidy, 2000–2001, 2002–2003).

Many teachers and teacher leaders with whom I work report confusing and often conflicting information about phonemic awareness. In this article I plan to clarify what we know about phonemic awareness and address some of the claims that are commonly made about it. I have organized my discussion around the following questions:

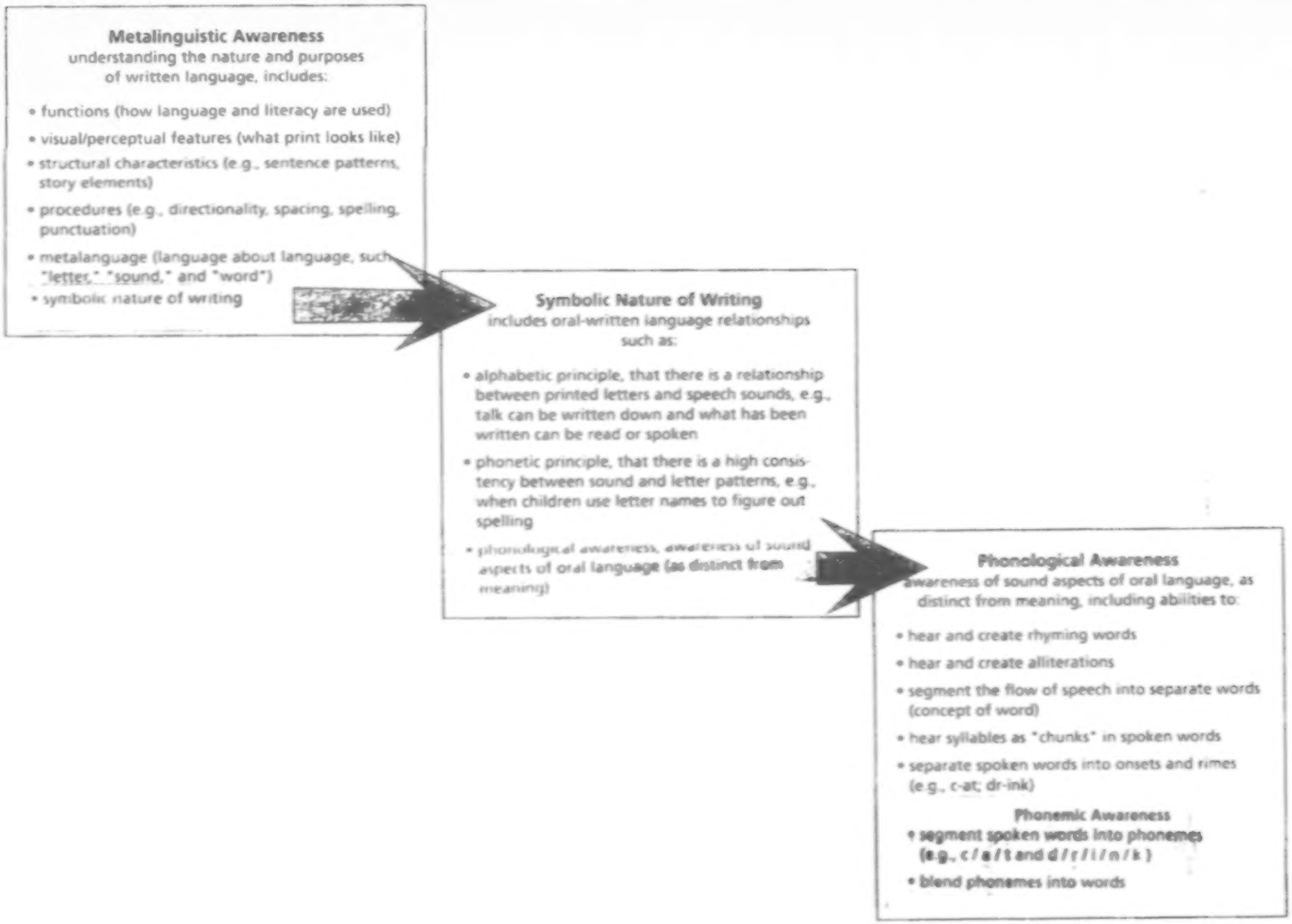
1. What is phonemic awareness and how does it relate to literacy development?
2. What do we know about learning and teaching phonemic awareness?
3. What can we expect young children to learn and when?
4. What are some classroom-based strategies for assessing phonemic awareness?
5. How can teachers foster development of phonemic awareness?
6. What are some classroom-based interventions for children who need additional support in developing phonemic awareness?

WHAT IS PHONEMIC AWARENESS AND HOW DOES IT RELATE TO LITERACY DEVELOPMENT?

Phonemic awareness needs to be understood as one small aspect of phonological awareness, which itself is part of a bigger notion called metalinguistic awareness. Although the terms phonological awareness and phonemic awareness are sometimes used interchangeably, they do have slightly different meanings. Phonological awareness is the larger of the two ideas; it is the awareness of various sound aspects of language (as distinct from its meaning). Phonemic awareness is more specific: the ability to detect each phoneme (the smallest unit of speech) in words. Figure 1 shows how phonemic awareness and phonological awareness are nested within layers of metalinguistic awareness.

Metalinguistic awareness, an omnibus term that includes an entire array of concepts related to language and literacy, develops in the preschool years and continues into adolescence and beyond. The major strands, or big ideas, of

Figure 1. Phonological and Phonemic Awareness Within the Context of Metalinguistic Awareness



Metalinguistic Awareness
understanding the nature and purposes of written language, includes:

- functions (how language and literacy are used)
- visual/perceptual features (what print looks like)
- structural characteristics (e.g., sentence patterns, story elements)
- procedures (e.g., directionality, spacing, spelling, punctuation)
- metalanguage (language about language, such "letter," "sound," and "word")
- symbolic nature of writing

Symbolic Nature of Writing
includes oral-written language relationships such as:

- alphabetic principle, that there is a relationship between printed letters and speech sounds, e.g., talk can be written down and what has been written can be read or spoken
- phonetic principle, that there is a high consistency between sound and letter patterns, e.g., when children use letter names to figure out spelling
- phonological awareness, awareness of sound aspects of oral language (as distinct from meaning)

Phonological Awareness
wareness of sound aspects of oral language, as distinct from meaning, including abilities to:

- hear and create rhyming words
- hear and create alliterations
- segment the flow of speech into separate words (concept of word)
- hear syllables as "chunks" in spoken words
- separate spoken words into onsets and rimes (e.g., c-at; dr-ink)

Phonemic Awareness

- **segment spoken words into phonemes (e.g., c / a / t and d / r / i / n / k)**
- **blend phonemes into words**

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metalinguistic awareness (shown in the first box in Figure 1) include awareness or understanding of the

- functions or purposes of language and literacy,
- visual-perceptual features of text,
- structural characteristics (from micro or word level to macro or text level),
- procedural knowledge (from encoding to self-regulating metacognitive reading and writing strategies),
- metalanguage (language used to talk about language and literacy, including grammar of sentences and genres), and
- symbolic nature of writing and its relationship to oral language.

Each of these major metalinguistic concepts can be separated into more discrete components. Key insights that children develop about the symbolic nature of writing and its relationship to oral language (shown in the second box in Figure 1) include the alphabetic principle (that there is a relationship between letters of the alphabet and speech sounds), the phonetic principle (that there are regular relationships between speech sound patterns and letter patterns), and phonological awareness (awareness of the sound dimension of oral language).

Phonological awareness can be further divided into smaller components such as abilities to hear alliteration, rhyming words, word boundaries, and parts of words (e.g., syllables, beginnings and onsets, endings, and phonemes, the smallest units of speech; see the third box in Figure 1.) Two key aspects of phonological awareness comprise phonemic awareness: (a) the ability to segment words into phonemes and (b) the ability to blend phonemes into words (see the last two bullets in the third box in Figure 1). Segmenting and blending phonemes have received a lot of emphasis in the research because they are the aspects of phonemic awareness most closely related to reading and spelling (Ehri & Nunes, 2002).

Children who have phonemic awareness are able to segment (break apart) a word into phonemes in order to write the word and to blend (put together) phonemes in order to read a word. Children with phonemic awareness, and who also have some knowledge of letter-sound relationships, are able to come up with an approximate spelling of a word (an invented spelling) or an approximate pronunciation, which must be checked with context and meaning cues in order to make sense of what is being read.

Although phonological and phonemic awareness are both important in learning to read, phonemic awareness tends to receive more attention because it is considered by some to be of critical importance in learning to read (Adams, 1990). While psychologists and researchers who work from a psychological perspective argue that phonemic awareness is the critical factor in literacy acquisition, in a joint position statement, the International Reading Association and the National Association for the Education of Young Children (IRA & NAEYC, 1998) state, "Although children's facility in phonemic awareness has been shown to be strongly related to later reading achievement, the precise role it plays in these early years is not fully understood" (p. 202).

Although psychologically oriented researchers argue that phonemic awareness is a prerequisite to reading, there is also evidence that it develops as a consequence of learning to read and write. When looking at the research literature as a whole (using the criteria articulated by Allington, 1997b), the convergence of evidence points to a reciprocal relationship between phonemic awareness and learning to read and write. In other words, phonemic awareness helps children learn to read and write, and learning to read and write helps children develop phonemic awareness (Weaver, 1998b).

There is also evidence that the alphabetic principle, understanding the relationship between speech and print, is the "linchpin of 'real' reading" (Roberts, 1998, p. 44). Furthermore, although young children's performance on phonemic awareness tests correlates with literacy achievement later on, language development, not phonemic awareness, is the highest correlate with reading achievement (e.g., Catts et al., 1999).

When one takes into account a broader knowledge base in literacy development and learning, it is apparent that while phonemic awareness plays a role in literacy learning, other factors play important roles and should not be overlooked.

WHAT DO WE KNOW ABOUT LEARNING AND TEACHING PHONEMIC AWARENESS?

Research into phonemic awareness can be divided into two major, very different perspectives of the reading process: a psychological-cognitive perspective and a language literacy-oriented perspective. Psychological-cognitive research focuses on word reading while language literacy-oriented research focuses on comprehension of text. Some of the confusion teachers face is that many claims are based on a very narrow, skills-based perspective (e.g., Simner, 1998) that takes into account only clinical, experimental research. Much of this research may not apply to children in classroom settings (Chapman, 1999; Troia, 1999).

It is also important that practitioners are aware of misinterpretations of research findings. As Weaver (1998b) notes, interpreters of phonemic awareness research "often overlook the forest for the trees" (p. 342), for example, by emphasizing very slight but statistically significant differences that support their beliefs while ignoring much more substantial and statistically significant differences, a "kind of distortion [that] is running rampant these days" (p. 342).

Using the criteria recommended by Allington (1997b), I reviewed a comprehensive array of research in order to address some of the most frequent claims about phonemic awareness and to clarify what the research actually shows about phonemic awareness.

Claim #1: Phonemic awareness is the single most important factor in learning to read.

Clarification: Phonemic awareness is an important factor, but it is only one of many abilities that children need in order to learn to read and write. As Wells (1986), Adams (1990), Braunger and Lewis (1997), and Gee (2001) have noted, children who fare well in school literacy have had language and literacy-rich preschool experiences that provide many opportunities for talk, experiences with oral and written stories, appropriate verbal interactions with adults during storybook readings, and opportunities to draw and write. Although phonemic awareness is an important predictor of literacy achievement, the ability that correlates most highly with literacy achievement is language development, not phonemic awareness (Allington, 2001; Allington & Cunningham, 1996, 1999; Blachman, 1996; Catts, Fey, Zhang, & Tomblin, 1999; Chaney, 1992; Coles, 2000; Gee, 2001; Roberts, 1998), especially expressive language (Snow, Burns, & Griffin, 1998).

Claim #2: The cause of reading problems is lack of phonemic awareness.

Clarification: While many older students who have difficulty reading do have problems with phonemic awareness, others with reading problems do not. There are many things that contribute to reading problems: social and cultural factors, poverty, language issues, lack of literacy experiences, inadequate reading instruction, and various individual differences (Allington, 2001; Allington & Cunningham, 1996, 1999; Braunger & Lewis, 1997; Coles, 2000; Roberts, 1998). There is no single cause of reading problems. However, the children who are most at risk of reading problems are poor children (Coles, 2000; Gee, 2001; Snow et al., 1998).

Claim #3: All children need to be tested in phonemic awareness to identify potential reading problems.

Clarification: "Tests of early phonological awareness (or lack thereof) do not fruitfully select those students who will later have problems in learning to read" (Gee, 2001, p. 14). Many kindergarten children with "weak phonological sensitivity" (Snow et al., 1998, p. 112) will go on to become adequate readers (Bradley & Bryant, 1983, 1985; Catts, 1991, 1996). Although kindergarten and first-grade teachers do need to assess children's phonological and phonemic awareness, they need not resort to tests. Instead, they should engage in ongoing direct, mostly informal assessments of children in language and literacy activities. Because it is difficult to do this in a whole class setting, it is best to observe children's phonemic awareness abilities in small group or individual activities (Au, 1998; Ericson & Juliebo, 1998). A child's writing is a powerful source of information: if a child can write with invented spellings that represent all or most phonemes, then that child is phonemically aware and need not be tested for phonemic awareness (Au, 1998; Braunger & Lewis, 1997; Chapman, 1996).

Claim #4: Phonemic awareness screening should take place at the beginning of kindergarten.

Clarification: At the beginning of kindergarten many, if not most, children who will "become normally achieving readers have not yet attained much, if any, appreciation of the phonological structure of oral language, making them nearly indistinguishable in this regard from children who will indeed encounter reading difficulties down the road" (Snow et al., 1998, p. 112). Given that most typically developing children do not have phonemic awareness at this time, the beginning of kindergarten is not an appropriate time for phonemic awareness screening (Au, 1998; Ayres, 1998; Stahl, 1997), although assessing more global aspects of metalinguistic awareness and phonological awareness that are precursors to phonemic awareness is warranted.

In kindergarten classrooms that engage children in language and literacy-rich experiences, children's phonological awareness becomes increasingly refined, and many children begin to develop phonemic awareness. The second half of kindergarten is a more appropriate time to begin assessment of phonemic awareness (Ayres, 1998; Weaver, 1998c). Monitoring children's development in phonemic awareness should continue through first grade. Children's invented spellings are a powerful resource for this purpose.

Claim #5: Phonemic awareness activities need to start at the beginning of kindergarten, or earlier.

Clarification: Children benefit from phonemic awareness activities when they have a firm understanding of the functions of print (Au, 1998; Richgels, Poremba, & McGee, 1996; Stahl, 1997). It is appropriate to conduct activities to help children understand the nature and purposes of print and to engage in phonological activities such as rhyming and so on in the first half of kindergarten (Au, 1998; Ayres, 1998). Children need onset-rime activities before the teacher focuses on phonemic awareness (Moustafa, 1998, Weaver, 1998c). Phonemic awareness activities are more appropriate in the second half of kindergarten and in Grade 1 (Ayres, 1998). Indeed, if children do not have the prerequisite knowledge, phonemic awareness training can interfere with their literacy development and cause what John Downing refers to as "cognitive confusion" (Downing, 1971–1972, p. 2) about the process of reading (see also Purcell-Gates, 1995; Stahl, 1997).

Claim #6: It is important to identify children with phonemic awareness problems as early as possible so as to prevent reading problems.

Clarification: As noted previously, some children begin to develop phonemic awareness during the mid-part of kindergarten. Most children (80–85%) acquire phonemic awareness by the middle of Grade 1 as a result of typical experiences at home and at school. Although most children who do not yet have phonemic awareness in kindergarten or early Grade 1 will not go on to have reading problems (Allington & Cunningham, 1996, 1999; Allington & Woodside-Jiron, 1999; Weaver, 1998c), ongoing monitoring of children's progress in concepts shown in Figure 1 during kindergarten and first grade is essential so that appropriate interventions can be implemented that address a child's difficulties (which may or may not include phonemic awareness).

Claim #7: Kindergarten children need phonemic awareness training in order to become good readers.

Clarification: Most kindergarten children will develop phonemic awareness in literacy-rich classrooms. Literacy-rich classrooms include a variety of activities to help children develop all aspects of metalinguistic awareness, concepts of print, and phonological awareness. The goal is not just a matter of learning phonemic awareness, but also being able to apply phonemic awareness in the context of real reading and writing (Ericson & Juliebo, 1998; IRA & NAEYC, 1998; Yopp & Yopp, 2000). Unfortunately, it is sometimes the case that research studies are not interpreted accurately by some advocates of direct training. For example, Scanlon and Vellutino's (1997) research, which showed that the more effective classrooms in their study engaged the children in significantly greater amounts of phonemic awareness activity (9% of the time in comparison to 6%), did not prove that phonemic awareness training is the best way to achieve phonemic awareness. The authors noted that more effective classrooms engaged the children in more meaning-oriented writing activities (with invented spellings) where children had opportunities to develop knowledge of how words work, including phonemic awareness.

Claim #8: Without phonemic awareness training, most children will become reading failures.

Clarification: Most children do not need direct phonemic awareness training in order to learn to read. Almost all children, however, do benefit from phonemic awareness activities that are meaningful and that help them make connections with what they are learning to reading and writing (Au, 1998; Purcell-Gates, 1995). Teachers should make phonemic awareness activities playful and engaging for young children (Allington & Cunningham, 1996, 1999; Au, 1998; Ayres, 1998; Braunger & Lewis, 1997; IRA & NAEYC, 1998; Roberts, 1998; Yopp & Yopp, 2000). It is also important to be aware of the caveat in *Preventing Reading Difficulties in Young Children:* "The effects of training [in phonological awareness, particularly in association with instruction in letters and letter-sound relationships], although quite consistent, are only moderate in strength, and have so far not been shown to extend to comprehension" (Snow et al., 1998, p. 251).

Claim #9: Phonemic awareness teaching needs to be systematic and intensive.

Clarification: Phonemic awareness teaching does need to be systematic, but this does not mean a commercial or lockstep program. Knowledge of the typical sequence of literacy development and ongoing assessment of children's literacy progress (using their writing and invented spellings, for example) is the best guide for planning phonemic awareness teaching. The degree of intensity will vary for individual children (Allington & Cunningham, 1996, 1999; Au, 1998; IRA & NAEYC, 1998; Yopp & Yopp, 2000). Ehri and Nunes (2002) point out that segmenting appears to be key: teaching segmenting is as effective as teaching both segmenting and blending, and teaching only blending is not effective (p. 121). Phonemic segmentation is central to spelling and can and should be addressed systematically within the context of children's writing and spelling. Clarke (1988) found that children in classrooms where invented spelling was modeled and encouraged developed superior spelling and phonic analysis skills in comparison to children where it was not encouraged or allowed. She concluded that children using invented spelling "benefited from the practice of matching sound segments of words to letters as they wrote and from using their own sound sequence analysis" (p. 307).

"Phonemic awareness instruction does not have to be lengthy to be effective" (Ehri & Nunes, 2002, p. 133). Indeed, as Ehri and Nunes point out, the optimal amount of time for phonemic awareness instruction is between 5 and 18 hours; there are only moderate effects for less than 5 hours or more than 18 hours. Despite the fact that this information was also included in the National Reading Panel report (2000), many teachers are being required to teach phonemic awareness for significantly greater amounts of time, which, besides being ineffective, takes time away from other important aspects of literacy learning and teaching.

Claim #10: Direct instruction in phonemic awareness is the best approach, particularly for children at risk for failure.

Clarification: Research does not support this despite claims of publishers and some advocates of direct instruction (Allington & Woodside-Jiron, 1999; Coles, 2000; McIntyre & Freppon, 1994; Taylor, 1998). No approach to phonemic awareness has been shown superior to others (Ehri & Nunes, 2002). While direct instruction may assist children to do some tasks on phonemic awareness tests or tests of decoding, there has not been shown to be an improvement on reading comprehension when direct assessments are used (Braunger & Lewis, 1997; Troia, 1999; Weaver, 1998b). Children do benefit from explicit instruction, but this does not equate with direct methods such as rote learning or skill-and-drill (Ukrainetz, Cooney, Dyer, Kysar, & Harris, 2000). All children, and those at risk in particular, need literacy instruction that helps them develop language and literacy in the broadest sense, not just performance on skill tasks (Au, 1998; Allington & Woodside-Jiron, 1999; Braunger & Lewis, 1997; Purcell-Gates, 1995; Roberts, 1998; Ukrainetz et al., 2000; Weaver, 1998a). There is a strong body of evidence showing that indirect approaches to phonemic awareness, particularly writing with invented spelling, fosters children's development in phonemic awareness (Adams, 1990; Chapman, 1996; Clarke, 1988; Wilde, 1992).

Claim #11: Phonemic awareness training will solve future reading problems.

Clarification: Phonemic awareness training may help some students, but because the causes of reading difficulty are various and complex, phonemic awareness will not solve all literacy problems. Phonemic awareness training has not been proven as the magic solution despite the claims of its advocates (Allington, 2001; Braunger & Lewis, 1997; Roberts, 1998; Stuart & Masterson, 1992). Gee (2001) and Wells (1999) argue that we need to look beyond skills and abilities to look at the sociocognitive resources (e.g., world and discourse knowledge) and dispositions towards literacy (e.g., identity as members of a literate community) that children bring to school literacy. While direct instruction in phonemic awareness (and phonics) has been shown to provide initial gains for at-risk students, "it does not bring them up to par with more [socio-economically] advantaged students, and they tend to eventually fall back, fueling a fourth-grade or later 'slump'" (Gee, 2001, p. 14).

Claim #12: Schools need special tests to screen children for phonemic awareness.

Clarification: Direct assessments of children engaged in activities that involve phonemic awareness are most helpful (Au, 1998). There are a number of informal assessments that use standardized procedures (as opposed to standardized tests) that teachers may find useful (e.g., Ericson & Juliebo, 1998; Yopp, 1995b). Children's invented spellings are an invaluable source of information about children's phonemic awareness (Au, 1998; Braunger & Lewis, 1997; Chapman, 1996; Clarke, 1988).

Claim #13: Schools need special materials to teach phonemic awareness.

Clarification: There is no evidence to support this claim. Instead, teachers need to develop a repertoire of language and literacy activities that foster children's overall literacy development, including phonemic awareness. Professional development and resource books with teaching strategies are more helpful than special phonemic awareness materials (Allington & Woodside-Jiron, 1999; Ericson & Juliebo, 1998; Yopp & Yopp, 2000). There is no research that supports the use of decodable texts such as *The bug is in the big bag.* Decodable texts are more difficult for children to read than texts with natural language patterns and a wider range of vocabulary. They do not engage children with ideas, which is what all print should do even at the youngest levels of schooling (Allington, 1997a; Allington & Woodside-Jiron, 1999; Pearson, 1998).

Claim #14: Whole language is the reason why so many children have trouble with reading because whole language teachers don't teach phonemic awareness or other phonics skills.

Clarification: There is no research evidence—only rhetoric—to support the claim that whole language has caused literacy problems. Advocates of direct instruction often ignore a great deal of research relevant to early literacy and research in whole language classrooms. Studies of young children's literacy learning in whole language classrooms show they develop phonological and phonemic awareness at least as well as those in traditional classrooms (Dahl, Scharer, Lawson, & Grogan, 1999; Klesius, Griffith, & Zielonka, 1991; McIntyre & Freppon, 1994). Many direct instruction proponents also claim that whole language teachers do not teach skills or do not use explicit instruction. Because it is beyond the scope of this article to address this issue, I refer readers to those who have given it an in-depth analysis and discussion: Coles (2000), Krashen (1998), McQuillan (1998), Routman (1998), and Taylor (1998). These authors document the flaws in arguments used by proponents of direct phonemic awareness and phonics instruction to cast whole language as the culprit in the literacy crisis, especially reading difficulties.

Claim #15: Research has proven that there is a best way to teach children to read and that is direct instruction in phonemic awareness and phonics.

Clarification: Phonemic awareness and phonics are part of a comprehensive literacy program. There is no evidence that any approach—traditional or whole language—is superior in developing phonemic awareness (Ehri & Nunes, 2002). There is no research that proves there is one best way to teach phonemic awareness, phonics, or reading (Allington, 1997a, 2001; IRA, 1997, 1999). I agree with Gee (2001) that Gerald Coles (2000) and Denny Taylor (1998) "do about as good a job as can be imagined debunking the so-called 'scientific research' that has fueled calls—in the media, public policy documents, and state legislation…for scripted direct instruction in phonics and related areas of literacy such as phonemic awareness" (p. 7).

WHAT CAN WE EXPECT YOUNG CHILDREN TO LEARN AND WHEN?

> Training studies have demonstrated that phonemic awareness can be taught to children as young as age 5. Yet, whether such training is appropriate for younger children is highly suspect. Other scholars have found that children benefit most from such training only after they have learned some letter names, shapes, and sounds and can apply what they learn to real reading in meaningful contexts (Cunningham, 1990; Foorman, Novy, Francis, & Liberman, 1991). Even at this later age, however, many children acquire phonemic awareness skills without specific training but as a consequence of learning to read (Ehri, 1994; Wagner & Torgeson, 1987). (International Reading Association & National Association for the Education of Young Children, 1998, p. 202)

The timing of phonemic awareness instruction is important. Purcell-Gates (1995) and others have shown that for children who lack basic understanding of functions, forms, and characteristics of spoken and written language, phonemic awareness training is meaningless and what they learn through training is not applied to literacy tasks. It is clear that children do not make much sense of phonemic awareness instruction until they have developed some other aspects of phonological awareness. A key development appears to be awareness of onsets and rimes, which acts as an intermediate step between segmenting words into syllables and segmenting into phonemes. An onset is the beginning part of a word before the vowel; the rime is what follows (see Figure 1 for examples). "Linguists call onsets and rimes the psychological units of a syllable" (Moustafa, 1998, p.139) because young children find it much easier to separate words into onsets and rimes than into phonemes. Thus there is strong support for the sequence of teaching children how to analyze spoken syllables into onsets and rimes and later to analyze onsets and rimes into phonemes (Goswami & Bryant, 1990; Moustafa, 1998; Treiman, 1985; Yopp & Yopp, 2000).

A review of research indicates the following sequence (based on Au, 1998; Ayres, 1998; Moustafa, 1998; Stahl, 1997), a developmental schema which suggests that rather than being the first step in teaching children to read and write, children's development of phonemic awareness should be situated within the global context of language development and metalinguistic awareness and, within this, the context of phonological awareness. There is strong evidence that children's development proceeds from larger, more global concepts to more specific ones (Au, 1998; Moustafa, 1998) as shown in Figure 1. Children's literacy learning (including phonemic awareness) is thus supported through the following sequence:

- Immersion in experiences with oral and written language to develop a strong language base and a repertoire of rhymes and stories (selected for their rhyme, alliteration patterns, and text features) helps children develop vocabulary knowledge, understanding of functions of print, awareness of forms of print (e.g., letters), and awareness of the sound dimension of language as distinct from its meaning (phonological awareness).
- Rhyming and alliterative play foster phonological awareness globally; this addresses concepts that are precursors to phonemic awareness (Bryant, MacLean, Bradley, & Crossland, 1990).
- Segmenting into syllables fosters the phonological skill of hearing parts of words; syllables are units that children become aware of well before they can discern phonemes (Moustafa, 1998; Snow et al., 1998).
- Onsets and rimes are an important bridging step to phonemic awareness, a psychological unit that children acquire with relative ease. They help children make the important step towards phonemic awareness and also to make analogies in reading and writing (Goswami & Bryant, 1990; Treiman, 1985).
- Phonemic segmentation, blending, and letter-sound correspondences

> address phonemic awareness specifically (Ehri & Nunes, 2002; Ericson & Juliebo, 1998; Yopp & Yopp, 2000). Segmenting is especially important (Ehri & Nunes, 2002).

It is important to provide an immersion in oral and written language and to introduce rhyming and alliterative play (often using children's names) in the first half of the kindergarten year. For most children, it is appropriate to introduce syllabic segmentation in the second half of kindergarten and then move to onsets and rimes (Ayres, 1998). The vast majority of children need support in phonemic segmentation, blending, and letter-sound correspondences in the latter part of kindergarten, continuing through Grade 1. A suggested teaching sequence many teachers find helpful is provided in Ericson and Juliebo (1998). Rigid adherence to a sequence, however, should be avoided. "Phonemic awareness development is not a lock-step process" (Yopp & Yopp, 2000, p. 142). One phase (e.g., matching) does not have to be mastered before providing experiences with another (e.g., blending).

WHAT ARE SOME CLASSROOM-BASED STRATEGIES FOR ASSESSING PHONEMIC AWARENESS?

A continuum of reading and writing development is useful for identifying challenging but achievable goals or benchmarks for children's literacy learning, remembering that individual variation is to be expected and supported. Using a developmental continuum enables teachers to assess individual children's progress against realistic goals and then adapt instruction to ensure that children continue to progress. (IRA & NAEYC, 1998, p. 207)

Although researchers use standardized tests to assess phonemic awareness, this is not necessary or even desirable for classroom assessment purposes. As Taylor (1998) notes, in phonemic awareness research, reading achievement is often taken to mean scores on standardized tests, particularly word reading, "pseudo-word reading"(p. 14), or decoding speed rather than comprehension measures. "Estimating where each child is developmentally and building on that base, a key feature of all good teaching, is particularly important for the kindergarten teacher" (IRA & NAEYC, 1998, p. 203). Instead of standardized tests, classroom teachers might consider various informal measures such as the Yopp-Singer Test of Phoneme Segmentation (Yopp, 1995b) or simple tests for rhyme detection, blending, segmenting, and orthographic knowledge such as those provided in Ericson and Juliebo (1998).

One of the best ways to assess phonemic awareness is through children's independent writing, particularly their invented spellings. Gentry (2000) proposes a very simple strategy he calls the Camel Test. He chose the word *camel* because it is part of most Grade 1 children's spoken vocabularies, but they are not likely to have seen it often in print. Several times a year, simply ask a child to spell the word *camel.* If the child knows the correct spelling, substitute another word such as *eagle, bacon,* or *magic.* A similar procedure is to select a sentence written by a child near the beginning of the school year (for example, in a journal) and dictate this sentence back to the child several times during the school year to document the child's progress and emerging literacy knowledge.

Invented spellings reveal how children are developing in phonological and phonemic awareness, knowledge of phonics (e.g., letter-sound relationships), and spelling patterns. The case study in Chapman (1996) shows how children's writing produced in the context of the regular instructional program can be used to document a child's progress in phonemic awareness as well as many other aspects of metalinguistic awareness and literacy knowledge.

HOW CAN TEACHERS FOSTER DEVELOPMENT OF PHONEMIC AWARENESS?

Phonemic awareness is very likely to develop as a consequence of learning phonics, learning to read, and learning to write, especially when teachers encourage children to use invented spellings (Adams, 1990; Allington & Cunningham, 1996, 1999; Cunningham, 1990; Snow et al., 1998). There is some evidence that direct instruction may produce higher initial scores on standardized tests of phonemic awareness and word attack skills, particularly with children labeled at risk or reading disabled when they are tutored one-on-one or in very small groups. On the other hand, there is also evidence that children's phonemic awareness develops equally well in traditional and whole language classrooms (Griffith, Klesius, & Kromrey, 1992; Klesius et al., 1991). After reviewing a broad spectrum of literacy research, Weaver (1998c) concluded that students in classrooms where skills were taught in the context of reading and writing typically make substantially greater advances in a variety of literacy-related skills, strategies, behaviors, and attitudes. Thus, such teaching may be superior overall to skills-intensive and phonics-intensive teaching, at least for the majority of our children (p. 39).

Children need to develop all aspects of language and literacy awareness shown in Figure 1 (not just phonemic awareness) in order to become successful readers. Phonological awareness instruction "must involve the sound system, with countless opportunities to hear stories, to repeat phrases, to invent similar sounding patterns, and to play with sounds in a manner that focuses children's awareness of the language upon syllables and phonemes" (Ayres, 1998, p. 249). Some children may need more explicit instruction in phonemic awareness, but in general the development of phonemic awareness is supported by

- language play, especially games that emphasize rhyming and thinking about the structure of words, particularly at the onset-rime level rather than the individual phonemic level;

- opportunities to help children notice and use letters and words, for example, alphabet centers and word walls;
- invented spelling, children's independent attempts at figuring out words when they write;
- language experience, dictation of children's own language;
- reading for meaning, including modeling through reading aloud, of demonstrating and problem-solving using phonemic knowledge while reading aloud, and providing manageable texts for beginning readers to apply their phonemic knowledge successfully (but not decodable texts, such as *Nan can the man*, for which there is no research support);
- rich experiences with language, environmental print, patterned stories, and Big Books that provide opportunities for modeling, demonstrating, and explicitly teaching phonemic awareness. (Braunger & Lewis, 1997, pp. 42–43)

Early experiences with literacy instruction influence children's motivation and attitudes toward literacy, with far-reaching consequences. "Therefore, classroom activities for young children must be captivating enough to hold the imagination, engaging enough to sustain active involvement for a period of time, and stimulating enough to motivate further literacy exploration" (Ayres, 1998, p. 214). Activities that are meaningful to children help them make connections to real reading and writing. Isolated phonemic awareness exercises, on the other hand, may actually create cognitive confusion about the nature and purposes of literacy (Chapman, 1999; Downing, 1971–1972; Tunmer, Herriman, & Nesdale, 1988). Yopp and Yopp (2000) suggest three principles in phonemic awareness instruction:

1. It should be child appropriate, which they describe as "playful and engaging (p. 132)."
2. It should be deliberate and purposeful (intentional, not accidental).
3. It should be viewed as part of a much broader literacy program.

One of the best ways to teach phonemic awareness is through writing. In language experience activities or shared writing, teachers can model how to stretch out words to hear the phonemes and represent them with letters. This can be modeled through whole class language experience activities and shared writing. Teachers can also use this approach in interactive writing with small groups and individual children (Fountas & Pinnell, 1996). Children should also be encouraged to write with invented spelling. Far from ignoring skills, invented spelling is likely the best way for children to apply their phonological skills and sound-symbol knowledge. (See Chapman, 1996, for an in-depth discussion of teaching and evaluating phonemic awareness through writing.)

Invented spelling is very much misunderstood by the public and some educators. Yet, it is endorsed as an appropriate strategy for developing phonemic awareness, for example, by the U.S. National Research Council report, *Preventing Reading Difficulties in Young Children* (Snow et al., 1998), and the joint position paper on early literacy by the IRA and NAEYC (1998). As Allington and Cunningham (1996) so aptly state:

> Children who are allowed and encouraged to 'invent spell' develop an early and strong sense of phonological awareness. For too long, we have failed to recognize the potential of early and regular writing activities in developing children's awareness of print detail and their understanding of how speech and print are related. (p. 130)

There are numerous resources to help teachers address phonological and phonemic awareness, such as *The Phonological Awareness Handbook for Kindergarten and Primary Teachers* (Ericson & Juliebo, 1998), which lays out a suggested sequence with assessment and instructional strategies and sample letters to parents. There are also useful articles for practitioners in journals such as *The Reading Teacher* (e.g., Yopp, 1995a, 1995b; Yopp & Yopp, 2000). When teachers use strategies such as those suggested here, it is clear that the question "How much teaching of phonemic awareness is necessary?" cannot be answered by a specific number of minutes per day or week because phonemic awareness can be addressed in the context of meaningful language and literacy experiences whenever appropriate.

WHAT ARE SOME CLASSROOM-BASED INTERVENTIONS FOR CHILDREN WHO NEED ADDITIONAL SUPPORT IN DEVELOPING PHONEMIC AWARENESS?

> To teach in developmentally appropriate ways, teachers must understand both the continuum of reading and writing development and children's individual and cultural variations. Teachers must recognize when variation is within the typical range and when intervention is necessary, because early intervention is more effective and less costly than later remediation. (IRA & NAEYC, 1998, p. 211)

Children who are not developing phonemic awareness by the middle of first grade need to be identified and offered intensive programs of support. However, while some people advocate allocating large amounts of time to teaching phonemic awareness, there are no longitudinal studies that support the effectiveness of this practice in increasing the reading achievement of the children when they reach the intermediate grades (IRA, 1998). Yopp and Yopp (2000) "urge teachers to be watchful for children who are not catching on—after multiple exposures" (p. 142) to phonemic awareness. They suggest the following strategies to help children who need additional support:

- increase the use of concrete objects or other cues
- include familiar letters
- focus on sounds that can be elongated
- use words with fewer phonemes

Approximately 15–20% of children struggle with reading. Some have difficulty with phonemic awareness; some pay too little attention to word patterns or print features (Clay, 1991); and some have oral language difficulties or a combination of problems (Catts et al., 1999). Some children struggle with reading because their home literacy experiences are quite different from school literacy or because they are learning to read in English as a second language. Instruction for cultural, ethnic, and linguistic minority students that is primarily skills-based may limit children's learning by failing to develop their analytical skills or conceptual skills or by failing to provide purposes for learning (Au, 1993; Gee, 2001; Knapp & Shields, 1990; Weaver, 1998c).

Roberts (1998) suggests there are two groups of children who benefit from intervention to support their literacy development: those who lack the necessary foundational knowledge of language systems and those who have knowledge of and experience with written language but have not yet acquired phonemic awareness. Children in the second group may become phonemically aware without direct instruction in an environment that supports exploration of print through focused activities (Richgels et al., 1996). They may also respond well to phonemic awareness training (Blachman, 1996; Purcell-Gates & Dahl, 1991). However, Blachman (1996) cautions that once children have acquired basic phonemic awareness, there is no evidence indicating that continued phonemic training outside a meaningful literacy context is of any value. Simply addressing phonemic awareness, however, is not sufficient support for struggling readers who, like all children, also need

- access and opportunity to a wide variety of reading materials.
- motivation to engage in reading.
- time to really read in real texts.
- supportive instruction in the how-tos of reading.
- self-esteem and confidence, which play integral roles in successful reading development.
- high expectations for success in a supported environment (Braunger & Lewis, 1997, p. 28).

CONCLUSIONS

A reading program that emphasizes decoding to the virtual exclusion of other areas, such as comprehension, meaning, and positive attitudes towards reading, runs the risk of creating new problems instead of (or as well as) solving old ones. It is very important that we maintain a variety of instructional options to accommodate these individual differences in children. No single program can yield a quick fix for all reading problems (Spear-Swerling, 2001).

An increasing interest in phonemic awareness has been fueled by advocates of direct instruction and by publishers of reading programs that emphasize decoding. Educators have been inundated with research (often used in promotional materials for commercial reading programs) that has led to confusing and conflicting information about phonemic awareness, its role in early literacy development, how to address it, and when to address it. Many kindergarten and primary teachers are unsure whether phonemic awareness training will help or hinder children's literacy development. In this article I have attempted to explain phonemic awareness and its relationship to literacy development and to clarify what research shows about learning and teaching phonemic awareness. I have suggested strategies for assessing phonemic awareness in developmentally appropriate ways. I have also described ways of fostering phonemic awareness that are language based and child appropriate, and I have reviewed intervention strategies for children who need additional support.

Rather than a commercial phonemic awareness training program (as a separate package or as part of a decoding-emphasis reading program), teachers really need a knowledge base in literacy development, a repertoire of developmentally appropriate and language-based strategies for assessment and instruction, and a few well-selected resources such as the ones recommended earlier in this article. Given the limited resources for education, and literacy in particular, it is disturbing that schools spend thousands of dollars on published programs (especially consumables such as workbooks) and standardized phonemic awareness and phonics tests when this money could be so much better spent on books for classroom and school libraries and for professional development. Phonemic awareness, though important, is only one aspect of literacy development. Although fostering phonemic awareness helps children off to a good start in school literacy, it does not contribute to gains in comprehension or solve the problem of the fourth-grade slump.

There are no quick fixes and there are no programs that will help all children. It is thoughtful and knowledgeable teachers that make the difference in supporting all children in becoming literate, which includes fostering their language and literacy knowledge and skills in the broadest sense as well as their phonological and phonemic awareness.

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Title: "The Why? What? When? and How? of Tutoring: The Development of Helping and Tutoring Skills in Children" in Literacy Teaching and Learning: An International Journal of Early Reading and Writing" Vol. 7 Nos. 1 & 2.

Author(s): David Wood

Corporate Source: Reading Recovery Council of North America, Inc.

Publication Date: 2003

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Title: "You go to b ab t rod the 16 levo (You got to be able to read the 16 level): Direk's Literacy Learning Story in First Grade" in Literacy Teaching and Learning: An International Journal of Early Reading and Writing Vol. 7 Nos 1+2

Author(s): Maria Luiza Dantas

Corporate Source: Reading Recovery Council of North America Inc.

Publication Date: 2003

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I. DOCUMENT IDENTIFICATION:

Title: "Metacognitive Strategy Knowledge: Comparison of Former Reading Recovery Children and Their Current Classmates." Literacy, Teaching and Learning: An International Journal of Early Reading and Writing

Author(s): Maribeth Cassidy Schmitt Vol. 7 Nos. 1+2

Corporate Source: Reading Recovery Council of North America, Inc.

Publication Date: 2003

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I. DOCUMENT IDENTIFICATION:

Title: "Envisioning Story: The Eye Movements of Beginning Readers" in Literacy Teaching and Learning: An International Journal of Early Reading and Writing. Volume 7 Nos. 1+2

Author(s): Peter Duckett

Corporate Source: Reading Recovery Council of North America, Inc

Publication Date: 2003

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I. DOCUMENT IDENTIFICATION:

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Author(s): Marilyn Chapman

Corporate Source: Reading Recovery Council of North America, Inc.

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